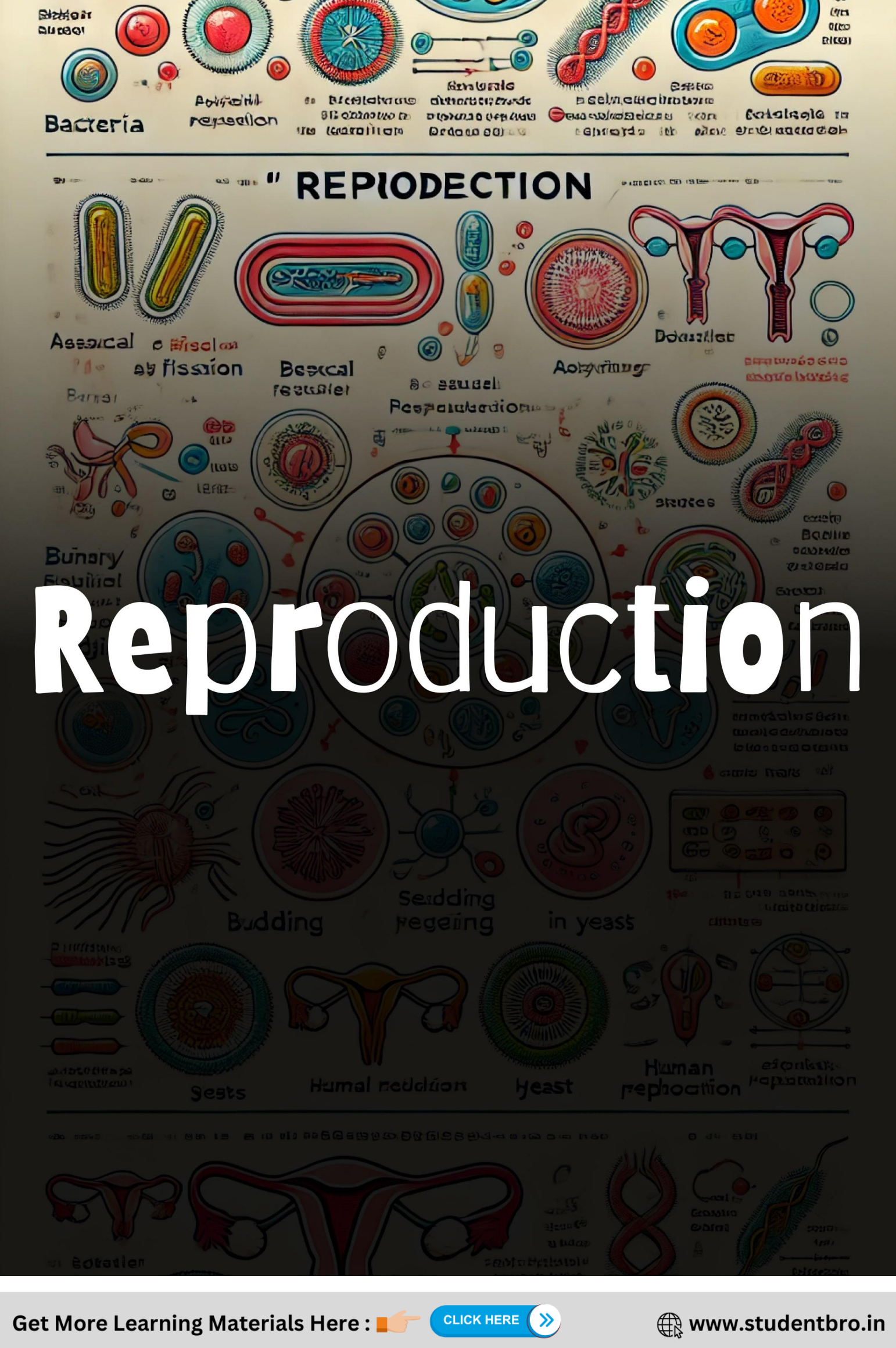


Reproduction

Reproduction

Development Biology (Egg - child - Adult)

Pre Natal development (Before Birth)

Post Natal development (After Birth)

Sexual

Formation of gamete and fusion of gametic (fertilization).

Zygote

↓

Oozoid (off spring)

More vital due to more genetic Variation.

Asexual

With or without formation of Gametes but New Progency formed by somatic cells.

Amoeba - Binary fusion

Hydra - Budding ←

Sponge - Gemmules ←

Blastema

↓

Blastozoid.

Pauthenogenesis

formation of Gametes But New Offspring Always formed by unfertilized egg.

↓

Parthenotes

Sex Organ

Primary Sex organ OR Essential Sex Organ

They are formation site of gametes and sex harmone.

Male

Testis (Sing.)
Testes (Plu)
↓
Sperm (Sing.)
Sperms (pleu.)

female

ovary (Sing)
ovaties (pleu).
↓
owum (Sing.)
Ova (plural)

Secondary Sex organ OR Accessory Sex organ

They provide passage for gametes and helps in fertilisation.

Male

Epididymis
Vas-deferens,
Prostate glands
Cowperis gland
or Bulbnutethral
Gland Seminal
Vesicle, Penis.

female

Uterus,
fallopian
tube,
Vagina,
Bartholin
Gland.

Epididymis:- Accessory duct (6m in length).

- → upper, highly coiled part.
- → Middle part.
- → Basal, least coiled part.

Development of Sex Organ

Primary Sex Organ

- Testes
- Ovaries

Both originated from Embryonic mesoderm and situated in abdominal cavity during Intra uterine life (IUL)/ Embryonic life.

In Male

Testes desends in scrontum in scrontum sac. After 8th month of IUL (2 to 2.5°C ↓) temp.

In female

Ovaries remains to abdominal cavity throughout life.

Secondary Sex Organ

- Male
- female

Male

Wolfian or Mesonephric duct

↓

Epididymis
Vas-deferens.
Seminal Veside.

↓

Due to Y-chromosome - T.D.F.

↓

Testes

↓

AMH ← Sertoli cells

Due to AMH regression of Mullarian duct.

↓

Prosthetic utride.

female

Mullarian or Paramesonephric duct.

↓

Vagina, uterus, F.T.

↓

Due to regression of wolfian duct

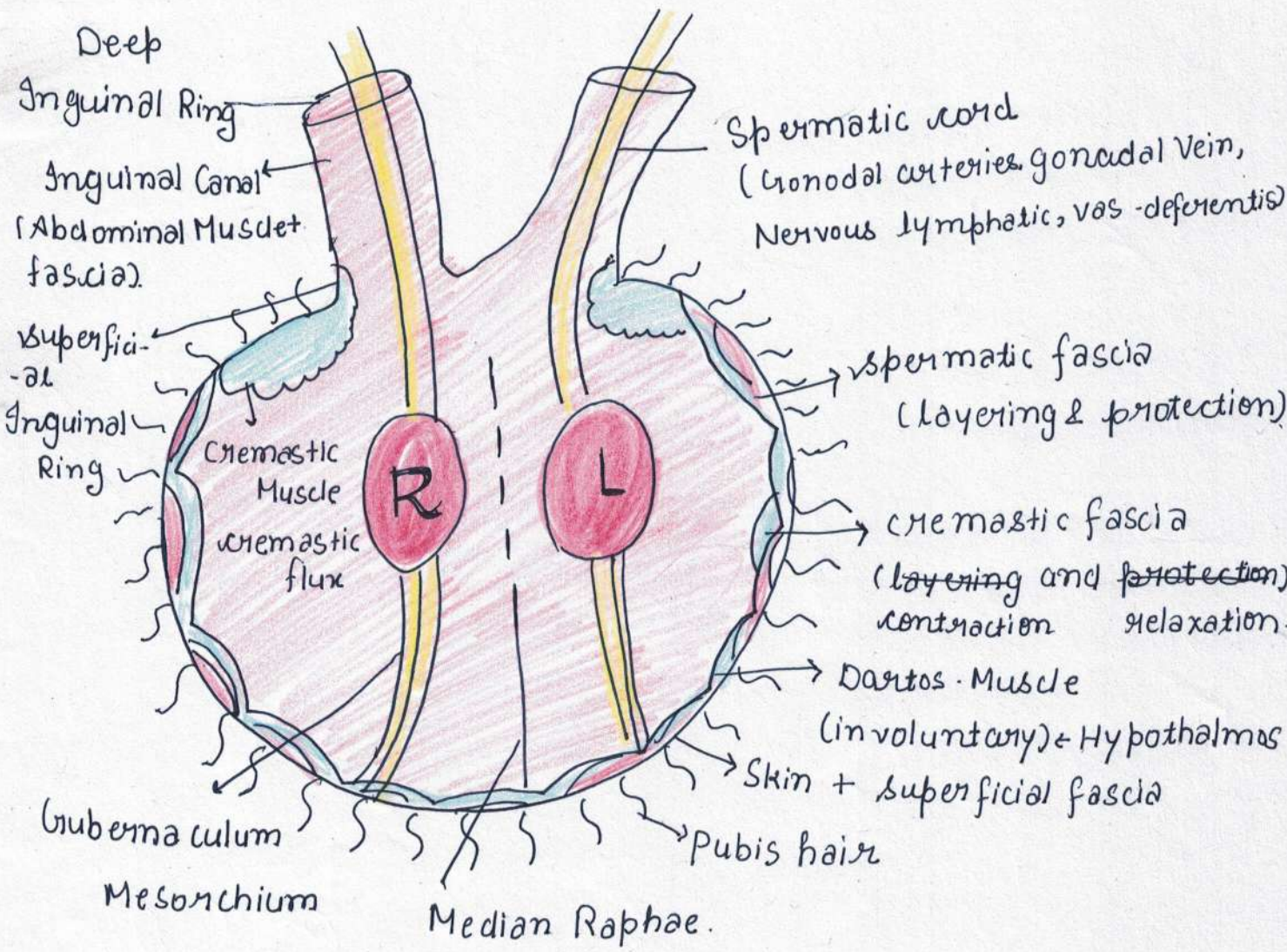
↓

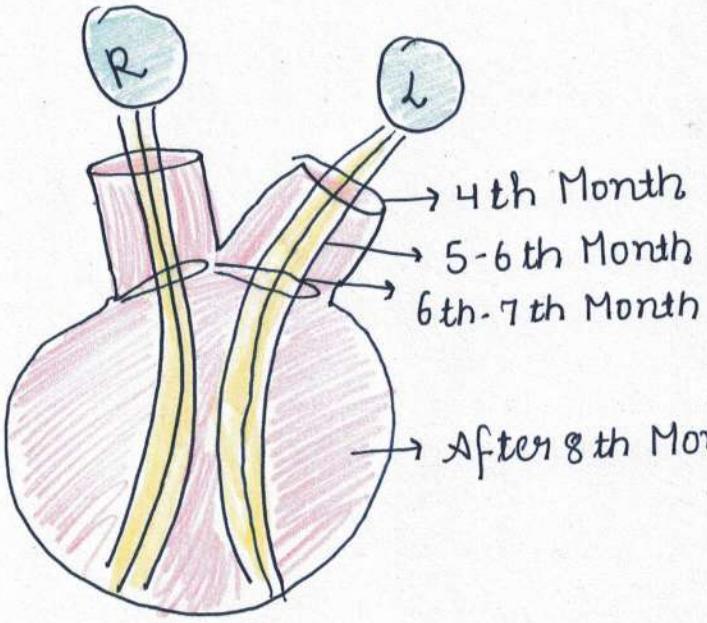
Epophrone
Paraphoron

Epophoron:- It is a thread like structure which is situated in between fallopian tube and Ovary.

Paraphoron:- It is also a thread like structure which is situated in between ovary and uterus.

Male Reproductive System





- Diachism → 2 testis → fertile
- Monorchism → 1 testis - Sterile.
- Anachism → 0 testis - Sterline.

- Surgical transfer of testis (Normal) → orchiopexy
- Surgical Removal of testis (Abdormal) → orchiodectomy.
- Removal of Hernia → Herniotomy → Repairing of Hernioplasty
  → Inguinal canal in repair.

Inguinal canal

- Male (wider)
- Female (Narrow)

Content of Inguinal Canal

- Male
  Spermatic cord.
- female
  Round ligament

Male : female
4 : 1

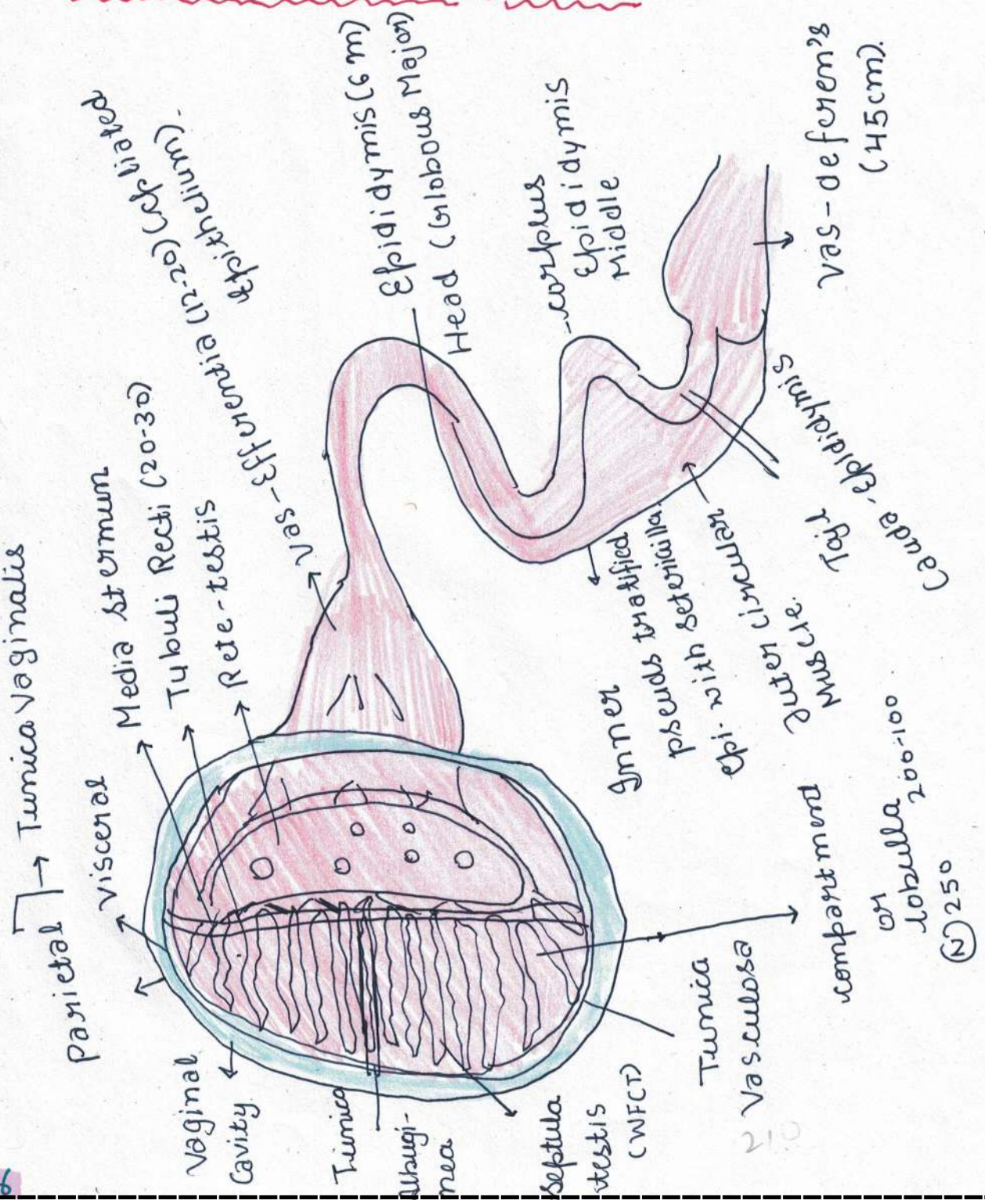
In female only Incomplete hernia occurs.

Inguinal Hernia

complete
Reaches upto Scrontum sac.

Incomplete
Remains in inguinal canal.

Internal Structure of Testis :-



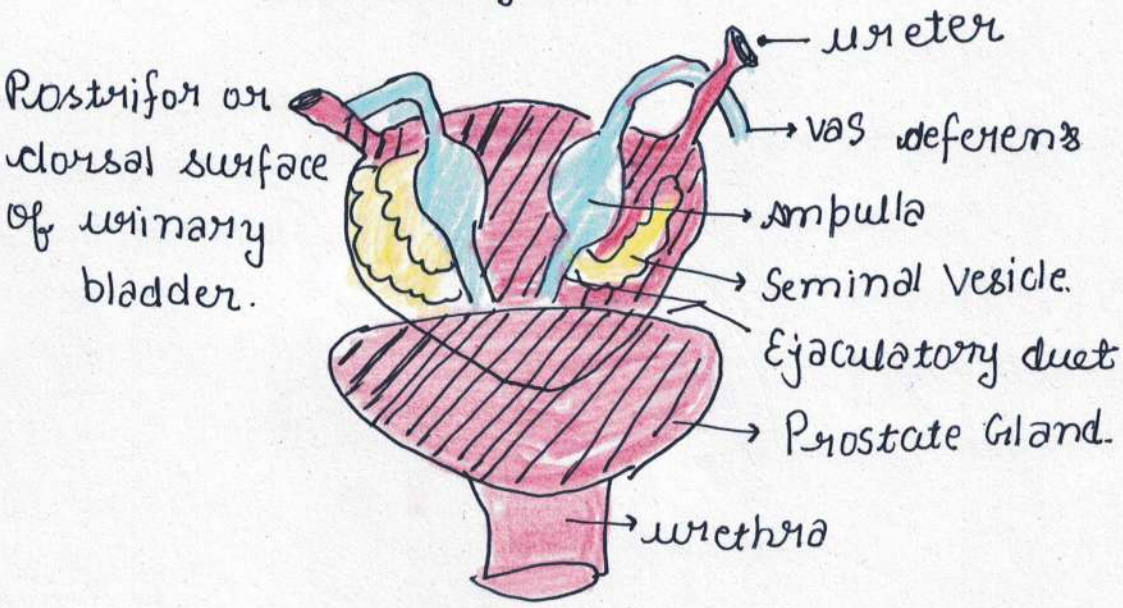
Functional Mutation of Sperms in Epididymis/ Decapcitation

- Some inhibitary proteins are released by Epididymis which supress motility of sperms therefore sperm become immotile in whole genital tract and conserve its Energy.

- A thin cholestriol layer is formed around apex part of sperm / acrosome therefore sperm do not show acrosomal reaction in whole male genital tract.

Pulsation Sperm are moved by circular muscle contraction in Epidiydymis and vas-deferen's and conserve their Energy.

Hydrocoel Enlargement of testis due to accumulation of peritonial fluid of vaginal capacity of tunica vaginalis.



Pathway : Sperms travel.

Intra testicular ductular system.

- Seminiferous tubule
- ↓
- Tubuli - Recti (20-30)
- ↓
- Rete Testis
- ↓
- Vas Effentia / Ducturs Efferent's (12-30)
- ↓
- Epididymis
- ↓
- Vas-deferens (Sctotum)
- through spermatic cord via inguinal canal
- Vas deferens (Abdominal cavity)
- Ampulla
- Ejaculatory duct
- urethra
- ↓
- semen Ejeculation (outside male body)
- Insemination (Enter in female Vagina)

Extra testicular ductular system → Epididymis

- Antibodies donot form against sperm because they never comes in contact with blood as they always travel within a ductular system.
- But sometime, due to any immunological problem antibodies may form against sperm which lead to

Seminal Vesicle fibrinogen

Prostate clotting Enzyme Profibrinolysis (Inactive)

Prosthetic Urethra

fibrinogen → fibrin coagulation of semen

Ejeculation of coagulated semen

Liquification of semen

After 30 Min of Ejeculation Profibrinolysis will convert in fibrinolysis.

Significance of Coagulated Semen :→

In coagulated form sperm have very less space to show their inotility that's why they can not move and conserve their energy.

Seminal Vesicle

- 1 pair in number
- Seminal fluid ⇒ PH = 7.3
- fructose → As a fuel to sperm.

Semen ⇒ Sperm + Secretion of All accessory reproductive gland.

⇒ Sperms + Seminal fluid + prosthetic + cowper's fluid.

⇒ 10% + 60-70% + 30% + 1-2%

Semen = Sperms + Seminal plasma

Sperm Count :→

3 to 4 ml semen / Ejeculation

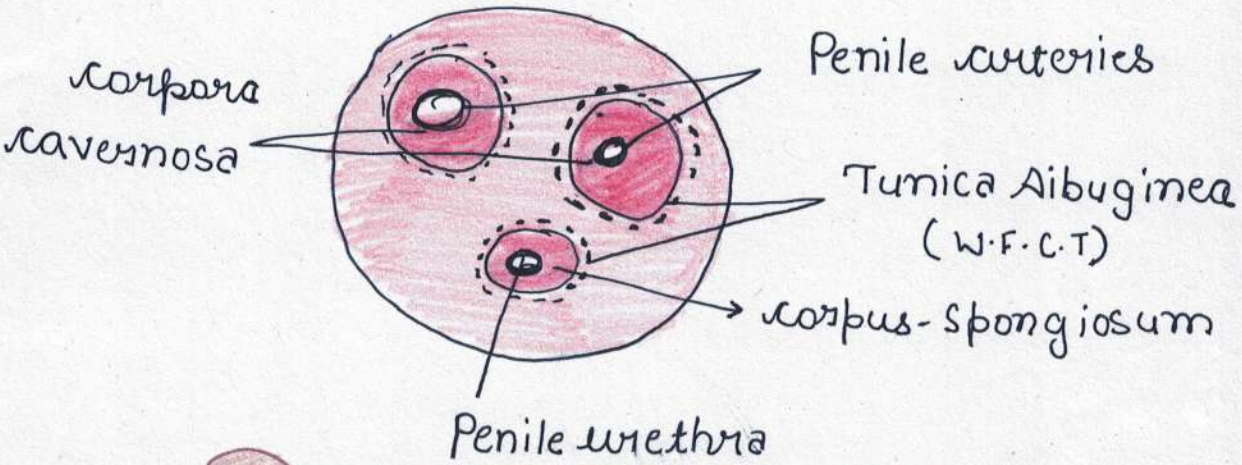
200 to 300 Million sperm's / Ejeculation.

20 to 120 million/ml

- ☆ Oligospermia → Less than 20 million sperm/ml.
- ☆ Azospermia → Almost Absence of sperm's in semen
- ☆ Asthenozoaspermia → Most of sperm's are immatile.
- ☆ Teratospermia → Abnormal morphology of Sperms.

- 60% sperms must be in proper shape and size and 40% sperm must be vigrous motile
- Vitamin E is a anti-sterlity factor its deficiency may lead to oligospermia and Azospermia.
- Vitamin A is necessary for sperms motility its deficiency may lead to Asthenozoaspermia.

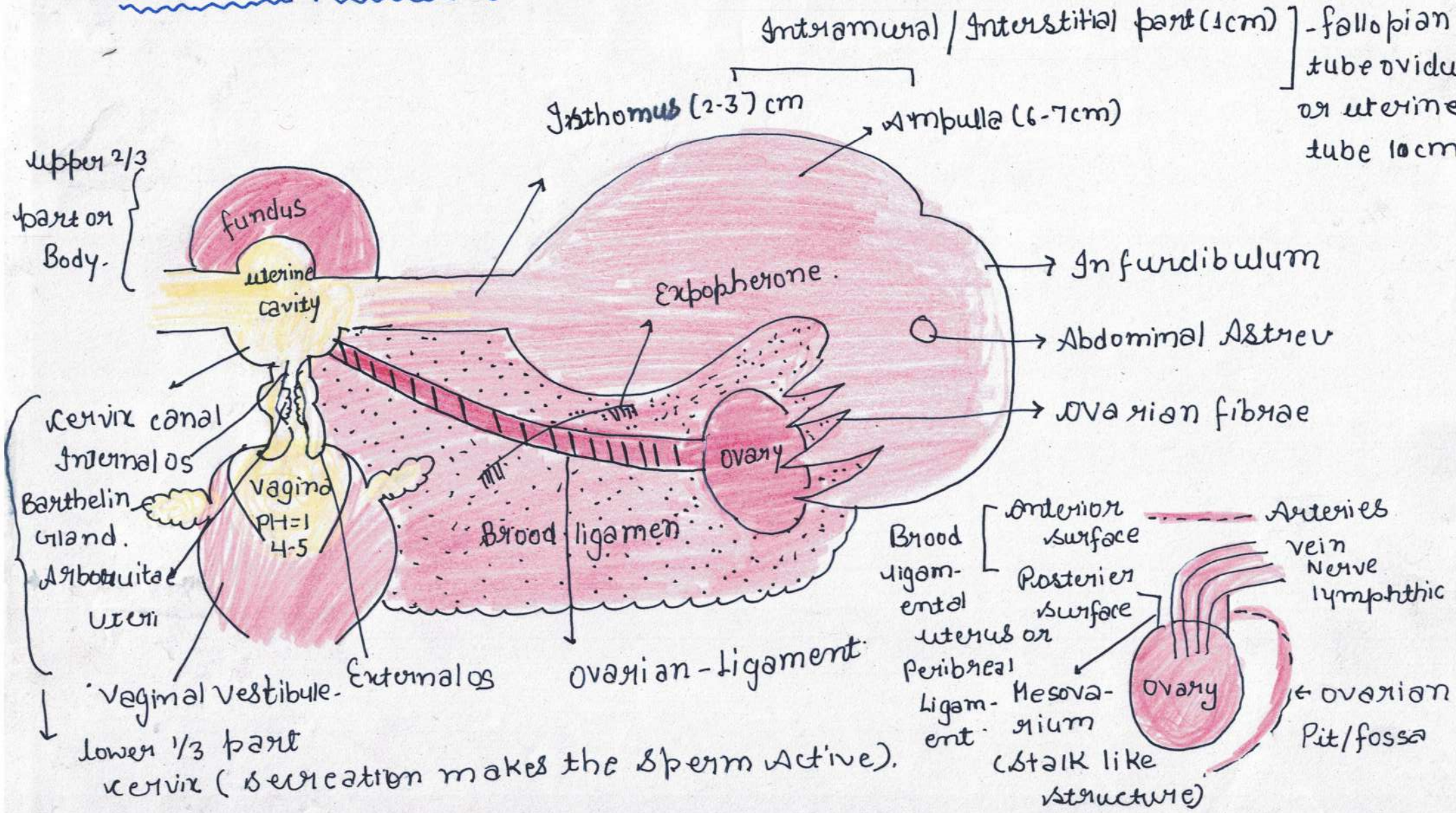
Transverse Section of Penis



ERECTION OF PENIS

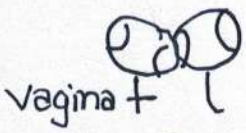
- Hypothalamus
- ↓
- Sexual Excitement
- ↓
- Para-Sympathetic Nervous system
- ↓
- Nitric-oxide-released by penile arteries
- ↓
- Vaso dilation of penile Arteries, cura Muscle Relaxed
- ↓
- Blood supply to Penis Increased.
- ↓
- Blood filled in Sinusoids.
- ↓
- Venous blockage
- ↓
- stretching of Tunica-Albuginea.

Female Reproductive System (Simple : uterus)



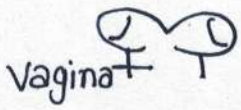
Evolution of Uterus

(i) Duplex



Eg: Rat

(ii) Bi partiate



Eg:- Carnivorous Animal

(iii) Bi cornuate.

Eg:- Rabbit

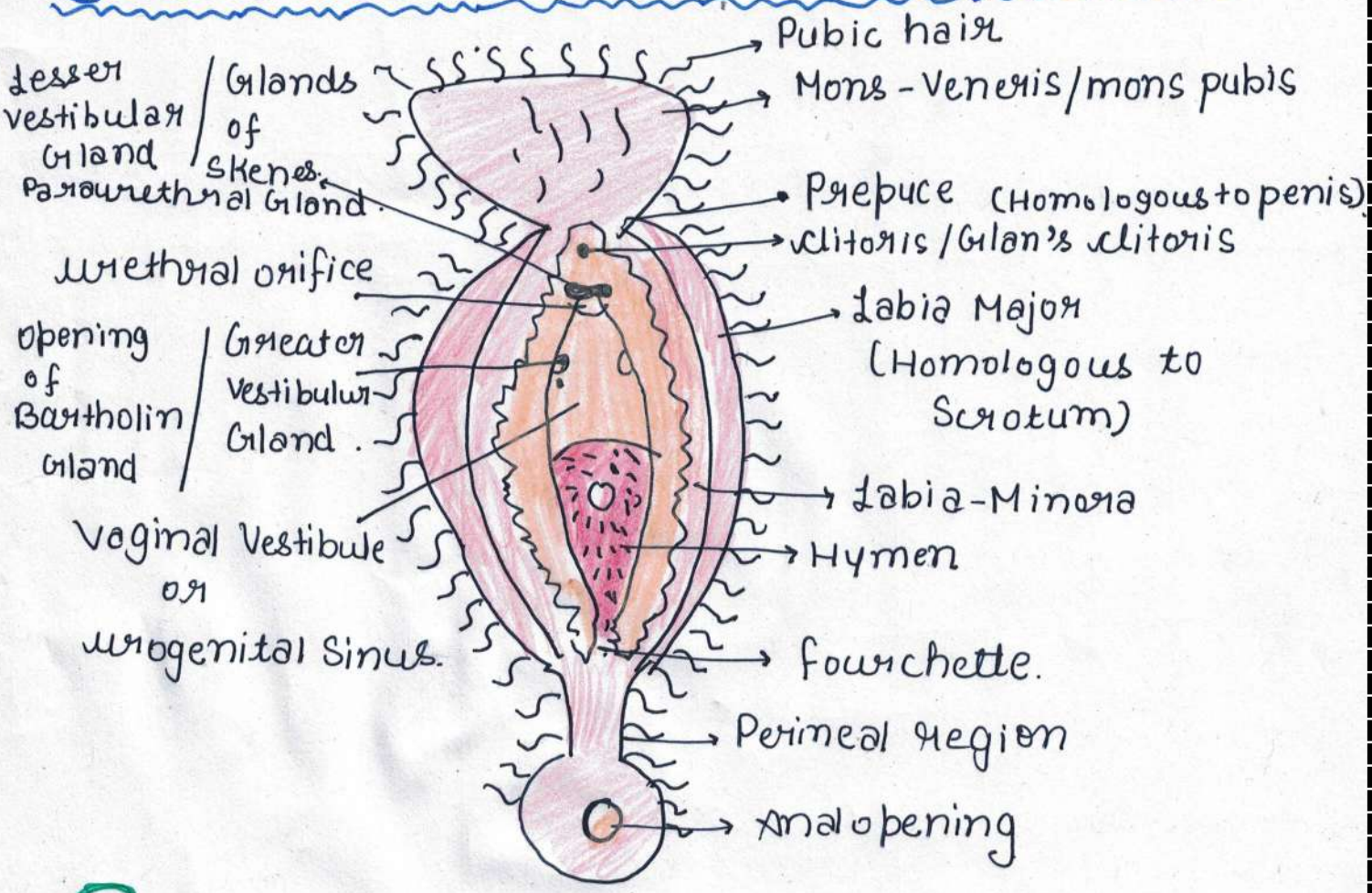
(iv) Simplex → Eg- human.

Histology of fallopian tube And uterus :-

	fallopian tube	uterus
Outer-most layer: Visceral peritoneum	serosal / Adventia	Perimetrium (Extra deposition of C.T.)
(i) Middle layer	thin	thick - myometrium ↓ Hypotrophy ↓ Size of cell's ↑sed.
(ii) Innermost : Mucosal layer.	simple columnar Epithelial → Secretory cells, Ciliated cells	Endometrium ↓ str. columnar Epithelium Always ont. ↓Hyperplasia (No.) of size of cells ↑sed) ↓ structural functional (New layer)

After puberty age when cervical secreation comes in vagina some bacteria i.e. (Actobacillus Acidophillus grocos in vagina and perform annaerobic respiration of glycogen which is present in cervical secreation so lactic acid forms which Maintain vagina pH, Acidic.

External Visualise Genetilia of female-Valva :-

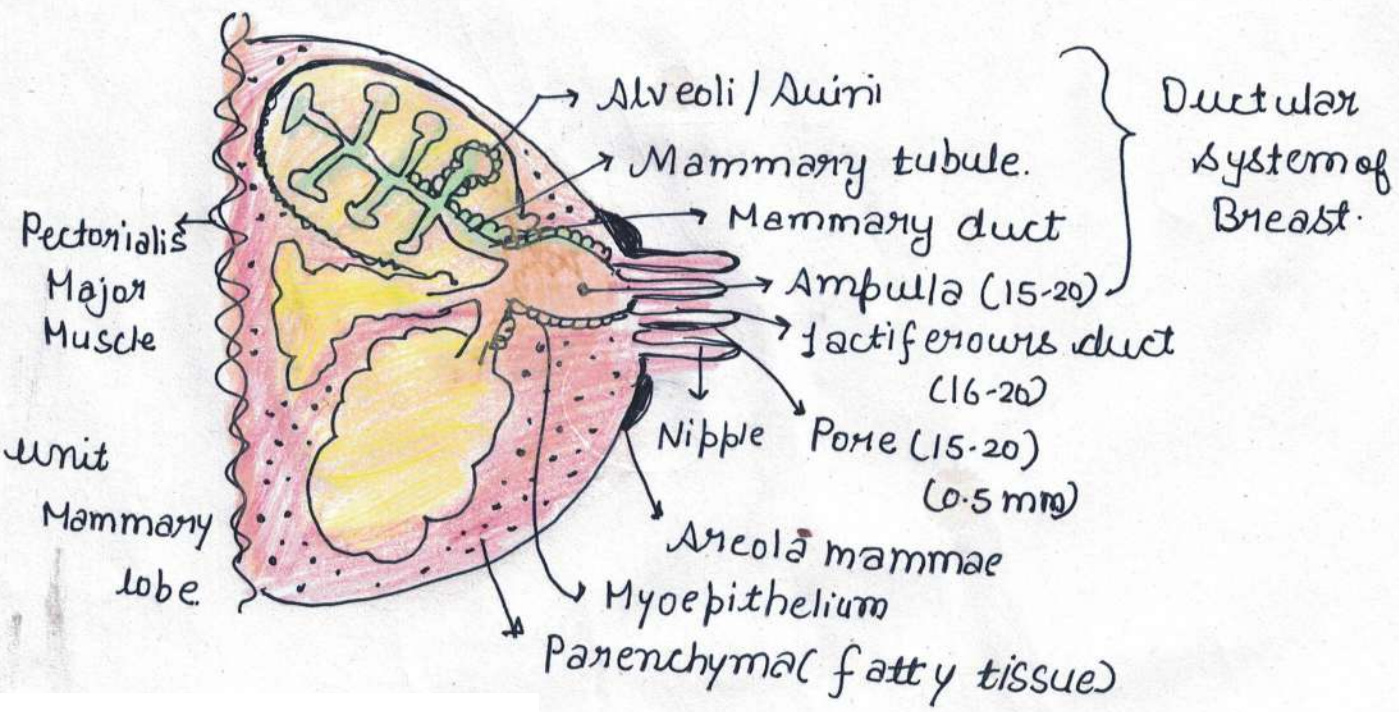


BREAST :-

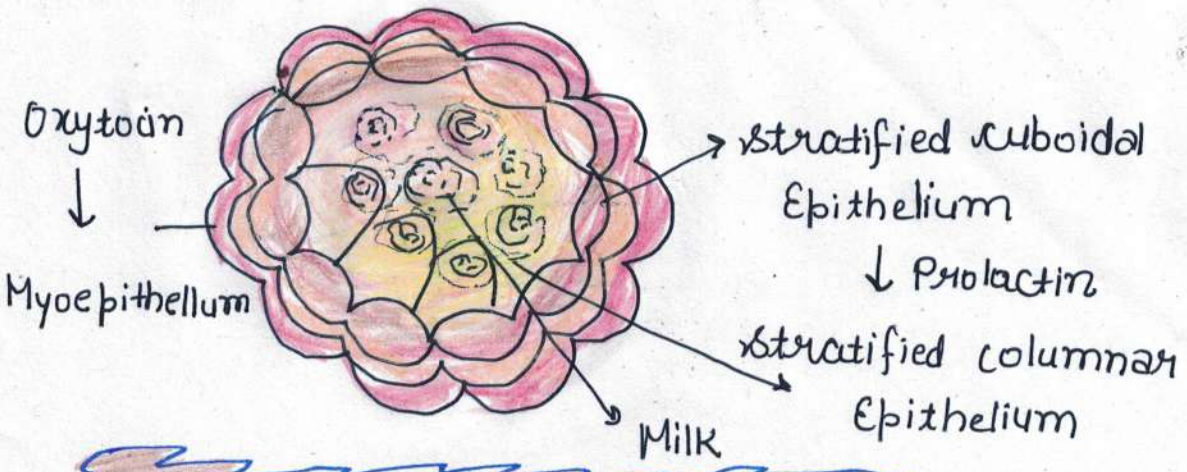
Developed mammary gland is known as breast.

They are not secretory sex organ of female they are secondary sexual character of female.

- At puberty these changes comes in female.
  - Menarch → starting Menstral cycle.
  - Pubarch → Appearance of public hair.
  - Thelarch → development of breast
- Mammary gland is modified sweat gland.
- This is apocrine in nature.
- In female mammary gland is of compound alveo tubular type.
- In Male Mammary gland is of compound of compound tubular type and it is inactive.



T.S. of Alveoli / Acini



Lactational Amenorrhoea

- After parturation due to high concentration of prolactin it gives (-)ve feedback to GnRH, LH and FSH so menstrual cycle do not start known as Lactational Amenorrhoea.
- It is a Natural contraception but Maximum upto 6 Months.

Weaning :→ Extra food supplement after 6 Month to baby.

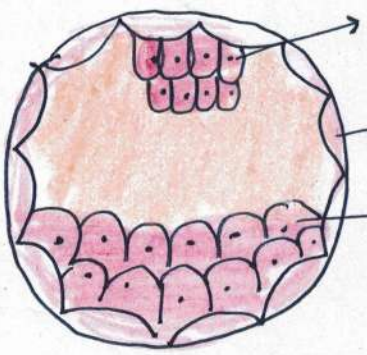
- During pragnancy from 7th month placenta release H.P.L (Human placental Lactogen) which stimulate the secreation of prolactin so milk formation start and stored in Ampulla. Now, it get concentrate in Ampulla and released just after parturation. This first concentrated secretary milk is known as Colastrum in which IgA Antibody is found.

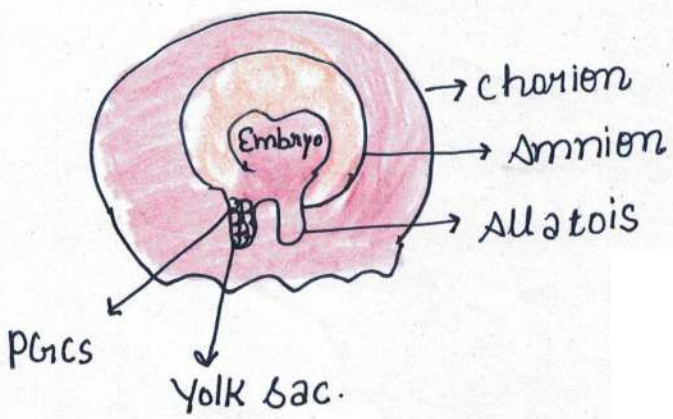
Milk Ejection reflex is a Neuro-Endrocine process.

Harmones related with Breast

- Estrogen → development of ductular system and parenchyma.
- Progesteron → development of Alveoli/Acini.
- Prolactin → Milk synthesis harmone.
- Oxytexin → Milk Ejection harmone.

GAMETOGENESIS





PGC 's formed due to division in trophoblastic cells.

New PGC's will migrate and Embedded to Yolk Sac Membrane [Extra-Embryonic Membrane]

Male

Now PGC's will migrate and embedded seminiferous tubules between sertoli cells.

Spermatogonia

Spermis

Female

Now PGC's will migrate and Embedded in ovary.

Oogenia

Ovum

Origin

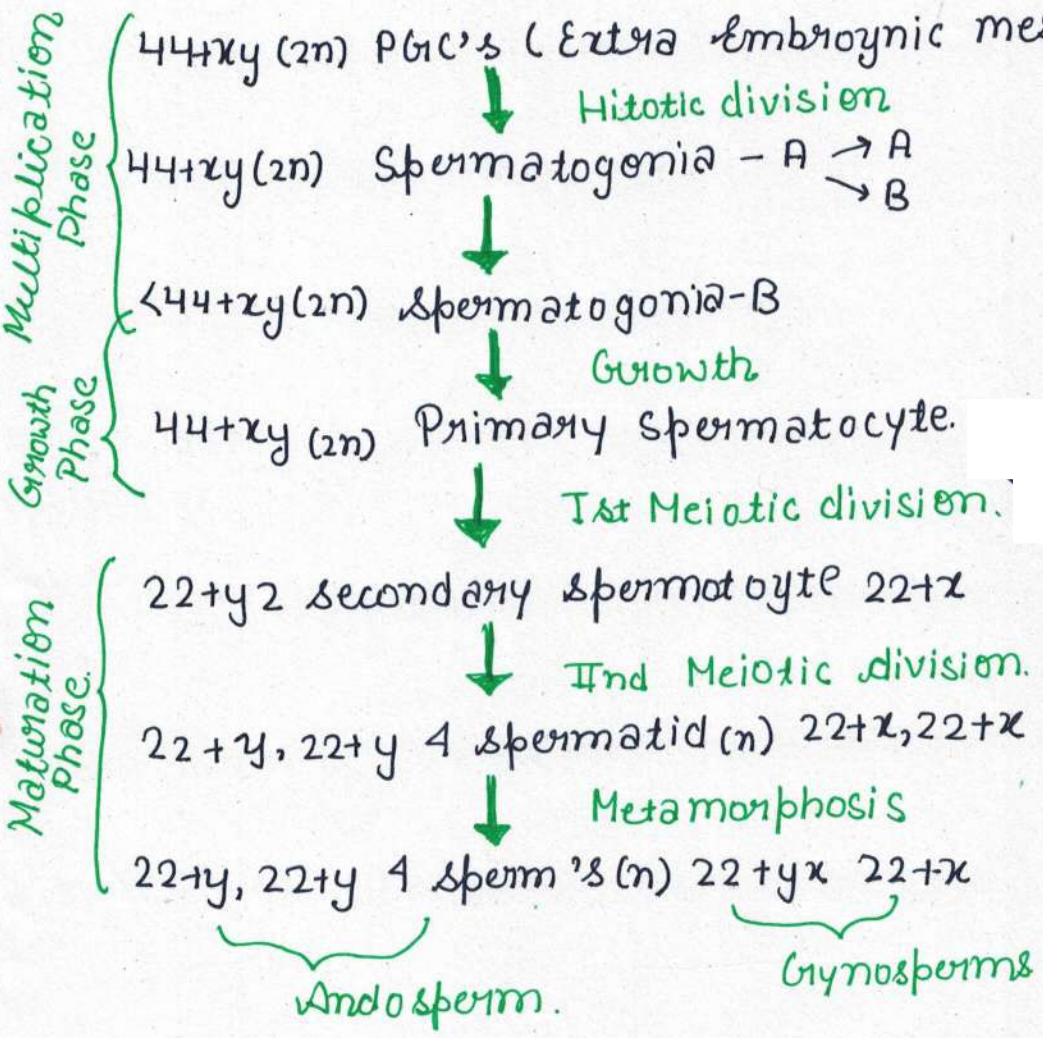
Extra Embryonic Mesodermal or Extra-gonadal origin.

Spermatogenesis:-

Germinal Epithellium (Seminiferous tubus)

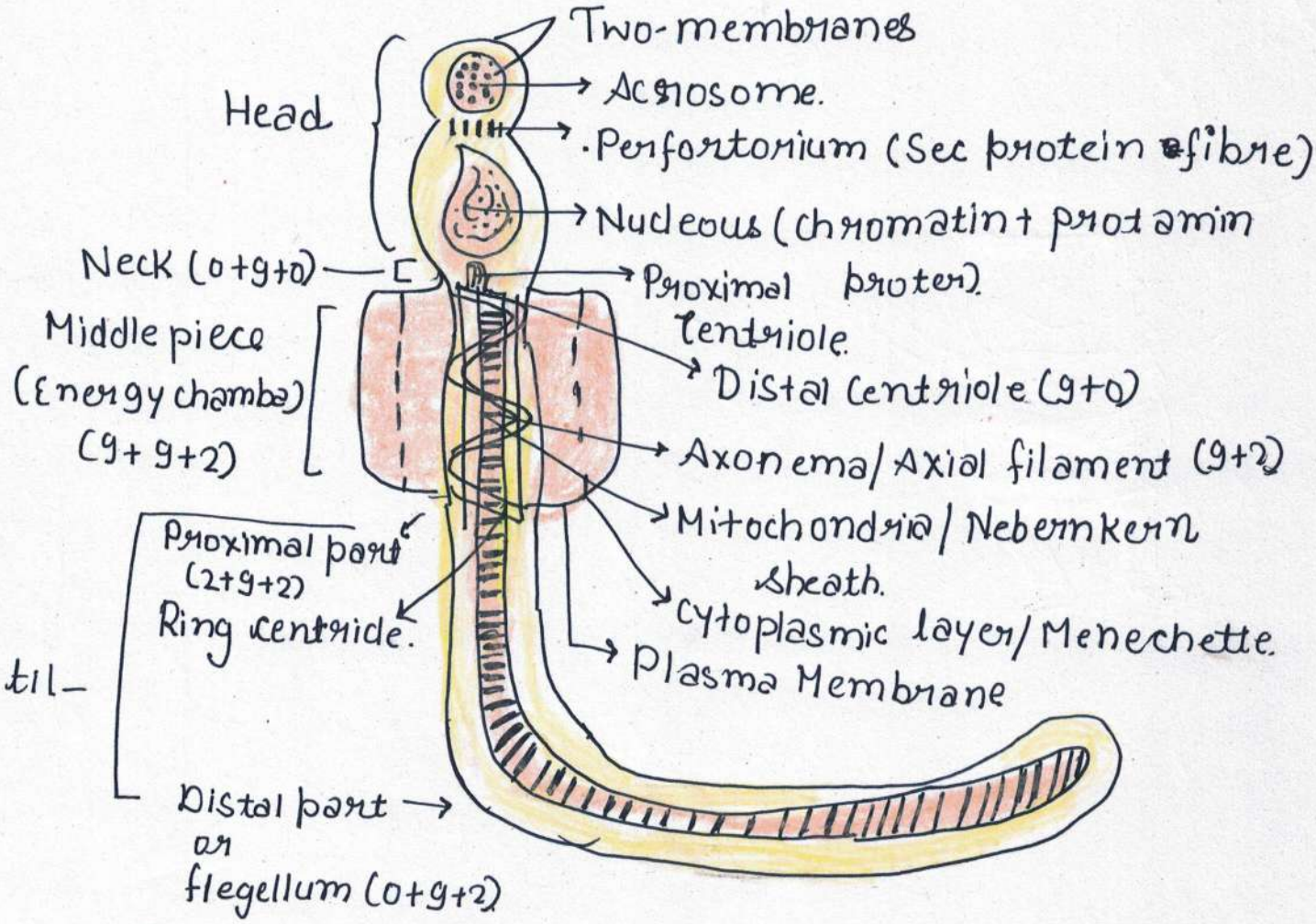
Cuboidal cells
Spermatogonia
(Extra gonodal origin)

Columnar cells
Sertoli cells
(Gonadal Origin)

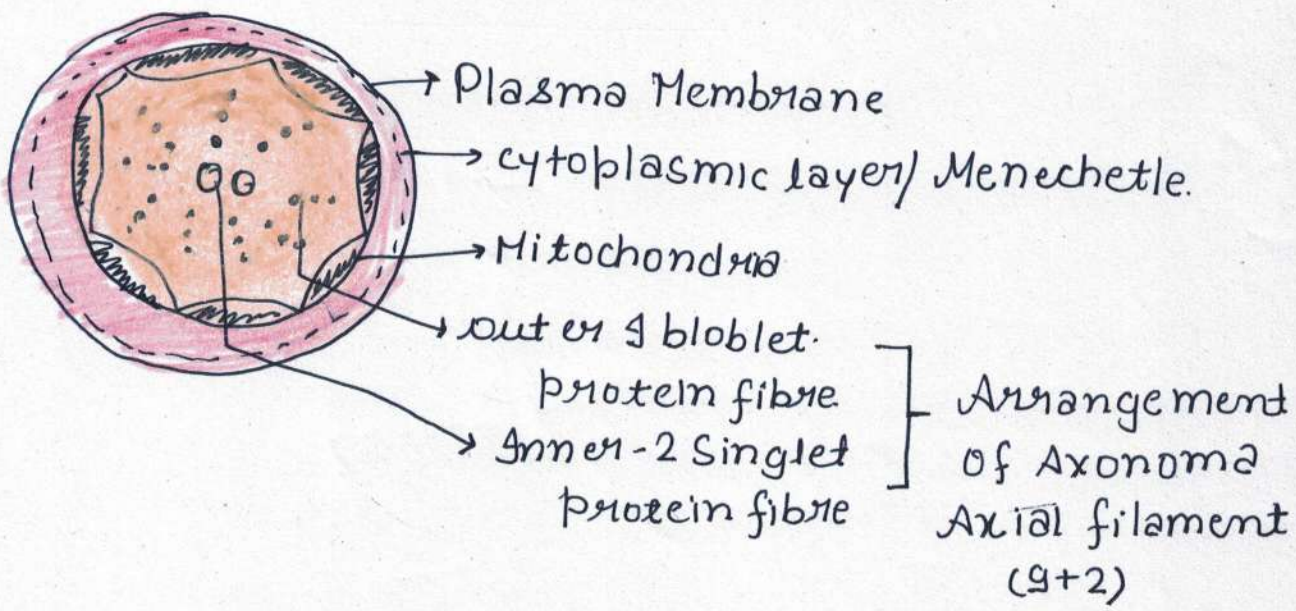


- PGC's $\xrightarrow[65\text{-}74 \text{ day's}]{\text{Spermatogenesis}}$ sperm's daily 10^{12}-10^{13}
- PGC's $\xrightarrow[\text{Spermatocytosis}]{\text{Spermatagenous}}$ Spermatid.
- Spermatid $\xrightarrow[\text{transformation}]{\text{Metamorphosis}}$ sperm.
  - Spermiogenes
  - Spermatelliosis.
- Libration of sperm from seminiferous tubule → Spermiation.
- Libration of sperm from testis → Semination.
- Libration of sperm from Male body → Ejeculation.
- Entry of sperm in female Vagina → Insemination.

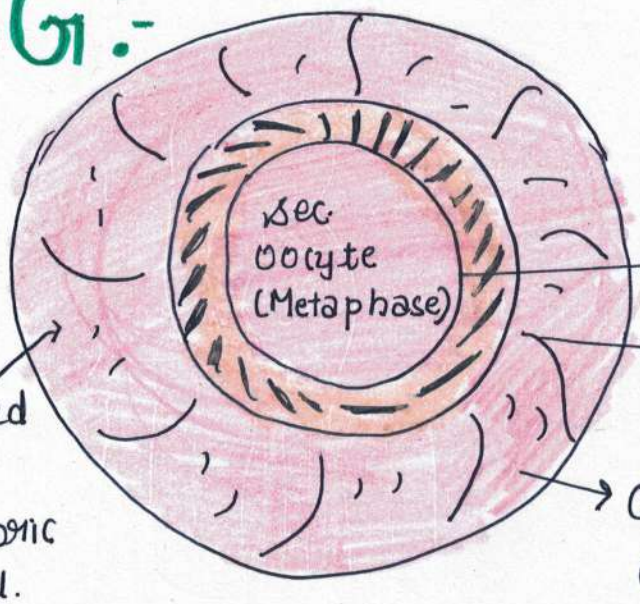
Structure of Sperm:-



Transverse Section of Middle Piece



EGG :-



Acrosome (Golgi-body complex)

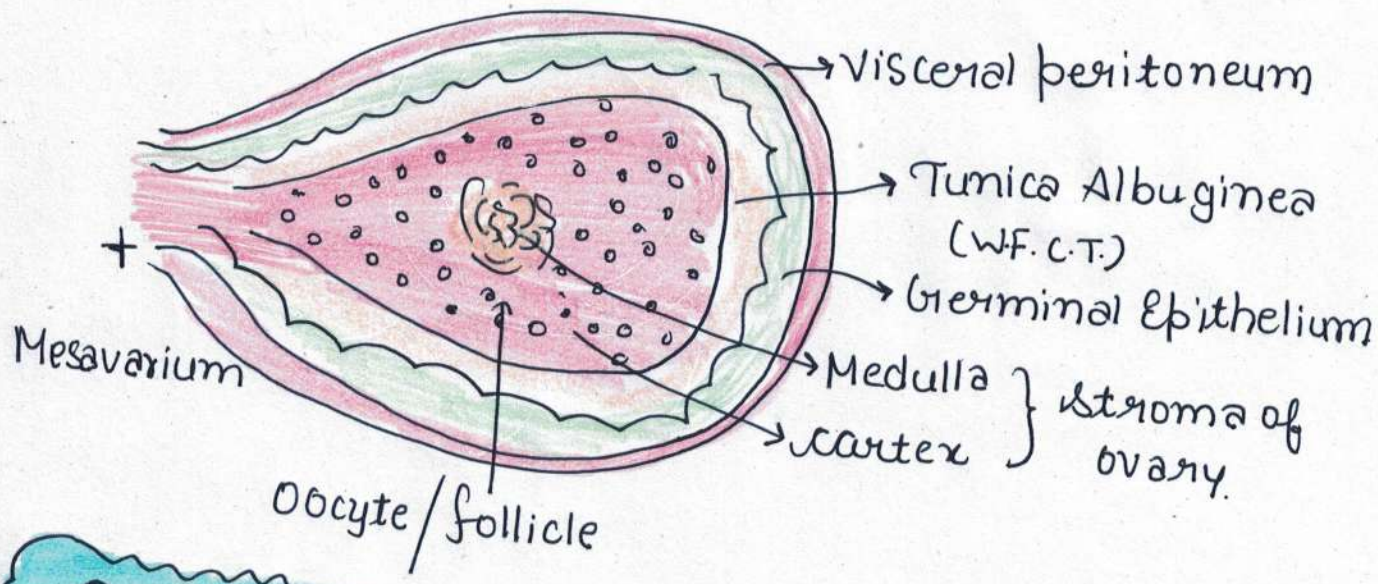
↓

Spermlysin Enzymes (Hydrolytic Enzyme's)

- **Hyaluronidase** → It dissolve Hyaluronic acid of granulosa cells of corona radiata.
- **Corona penetrative Enzyme.** → This directly kills granulosa cells of Corona radiata.
- **Zona lysin or Proacrosin.** → Acrosin / Zona-lysin (Active) → It dissolve Zona-pellucida

- **Proximal Centriole** → It promotes cleavage in fertilized Egg or Zygote.
- **Distal Centriole / Basal granule** → It arrange axonema.
- **Perforatorium** :→ This provide rigidity to Sperm head while penetrating to Aocyte.

Internal Structure of Ovary:-



Oogenesis:-

44+XX (2n) PGC's (Extra Embryonic Mesodermal)

↓ mitotic division

44+XX (2n) oogonia.

↓ Growth.

44+XX (2n) pri-oocyte.

1st Meiotic division started but arrested at prophase (diplotene) stage till puberty

↓

Pri-oocyte (prophase)

↓

Sec. oocyte (n) (22+X).

1st polar body (n) (22+X)

IInd Meiotic division started but Arrested at Metaphase.

↓

Sec oocyte (Metaphase)

↓ (ovulation due to L.H.)

Via. peritoneal cavity.

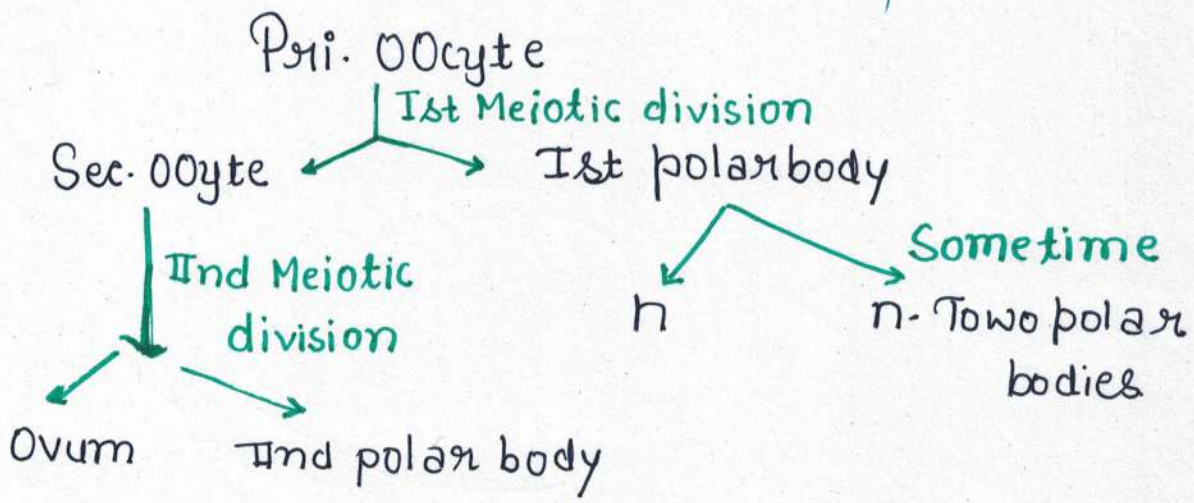
Sec. oocyte { Metaphase in ampulla of ft.

(II meiotic division completed due to penetration of sperm forming Metaphase promoting factors turn in Anaphase promoting complex).

↓

1-Ovum (n) 22+X

IInd polar body → degenerated (n) 22+X



- In regular Menstrual cycle normally are polar body form.
- In Regular menstrual cycle sometime two polar bodies may form.
- In complete oogensis normally two polar bodies form.
- In complete oagensis sometime to Maximum three polar bodies May form.

Oogonia → Growth Phase → Pri oocyte

Previtellogenesis

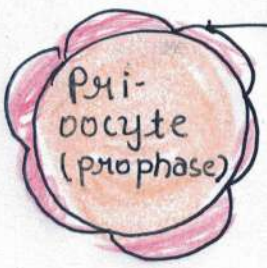
- Gene Amplification
- Nucleous size Increased
- No. of Nucleolous increased
- Cytoplasm Increased.
- Cell organelles Increased.
- Golgi-body → Cortical granules.

Vitellogonesis
Yolk formation,

- foetal liver - Maily yolk
- oocyte → Kinase Enzyme.
- ↓
- Concentration of Yolk.

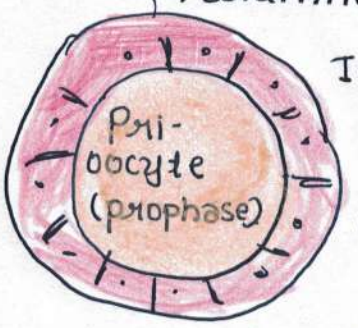
Development of Graffian follicle (G.F.)

(i) Prem primordial follicle:-
(Embryonic life)



follicular cells
or
stroma cells

(ii) Primordial follicle:-
Embryonic life → till puberty



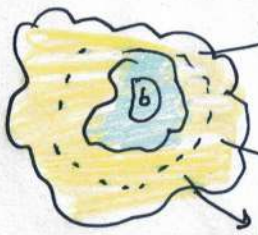
→ columnar cells

I.U.L = 7 Million
↓
At birth → 2 Million
↓
At puberty = 4 lakh.

C. Albicans (white body)
(degenerated (. leuteum)
At 28 th day of M.C.

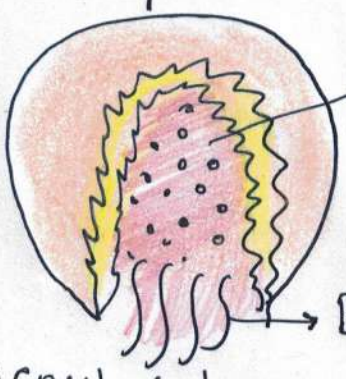
↑ Next 5 days (degenerate)

Corpus leuteum (yellow body)
(At 23rd day of MC)



→ leutene / carotene pigment
(yellow colour)
→ Progesterone (Mainly)
→ oestrogen (partially)

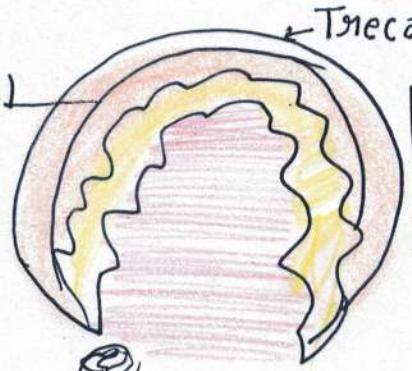
⑥ Reputered G.F
(At 14th day of M.C)



→ Blood clots

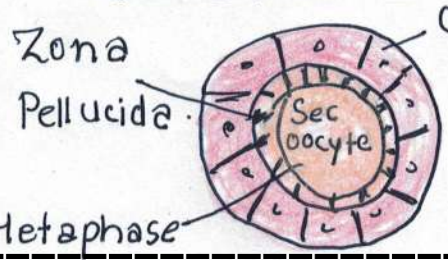
→ Blood capbilaries

Corpus hoemoroghium
(Red body)
(Initial Stage of C. leuteum)



Trachea Interna
Theca Externa
Progre-
sterone
(Mainly)

Interstitial Cells



Zona
Pellucida
Corona
Radiata.
Metaphase

Primordial follicle
(Embryonic stage to puberty)
(7 million → 4 lakh)
Pri. OOcyte (Prophase)

↓

Primary follicle
(During - puberty)
(1.2 to 1.6 lakh)
(Pri. oocyte (prophase)

↓

Secondary follicle
(1.2 to 1 Each menstrual cycle)
Pri. oocyte (prophase)

↓

Mature tertiory follicle / G.f.
(1 In Each mic)
Sec. ooyte (metaphase)

↓ ovalution → in ovary.

Sec. oocyte (meta) via
Peritoneal cavity in
Ampulla of F.T

Yes → IInd meiotic division completed → Ovum → Zygote

No → sec. ooyte degenerated

Reputered G.F

↓

C. haemorghium.

↓

C. leuteum

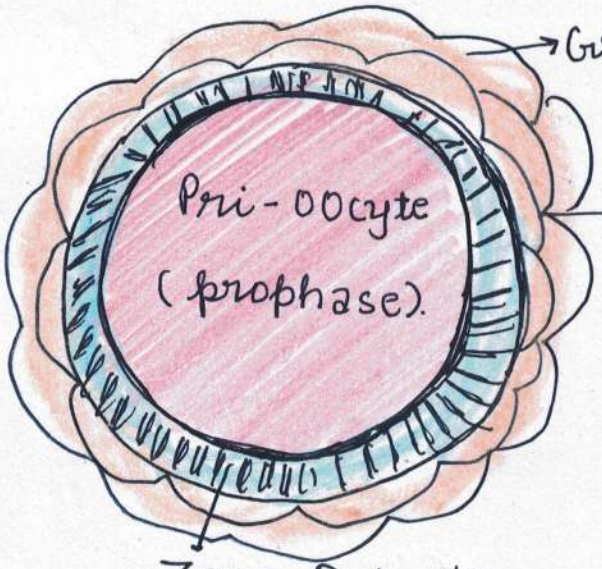
Yes → corpus leutcum will Maintain till partur-tation. (Due to H.C.G).

No → C. leuteum will dege-nerated.

↓

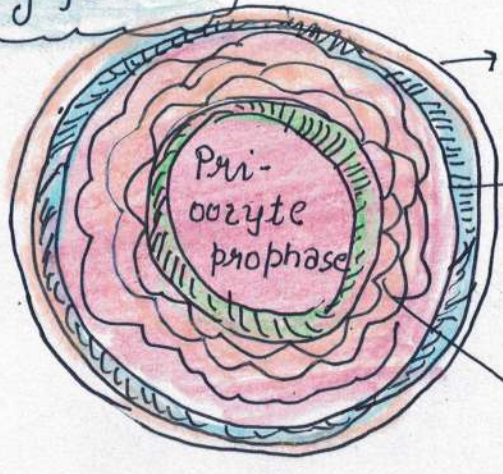
C. Albican's

③ Primary follicle During puberty:-



- In each M.C.
  - 6-12 pri follicle Activated.
    - ↓
  - 1-2. sec. follicle.
    - ↓
  - 1 ter. follicle
    - ↓
  - 1 mature tertiary follicle
    - or
  - 1 Graffian follicle.

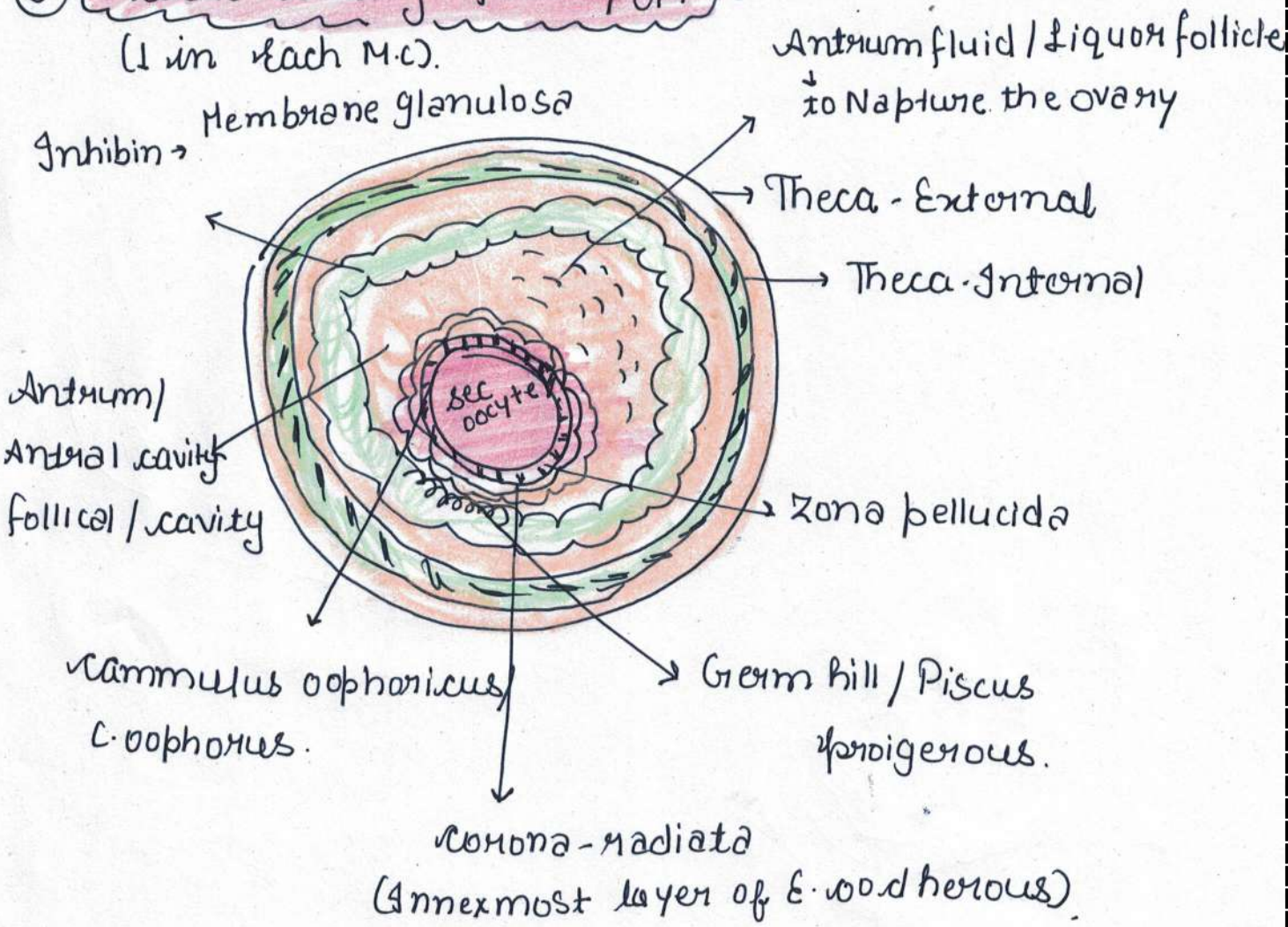
④ Secondary follicle (1-2 in each follicle)

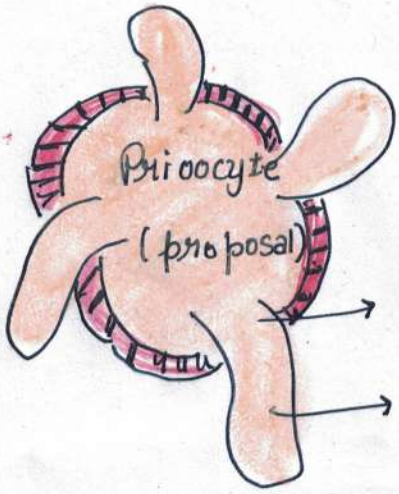


- Theca. External (connective tissue layer)
- Theca - Internal (Epithetial layer) (Mainly)
  - ↓
  - oestrogen
  - ↑
  - Menobroma Granulosa (partially)

(5) Mature tertiary folicle / G.F :-

(1 in each M.C).





S.S;

- Granulosa cells or follicular cell's are suppose to provide Nutrition to oocyte and also release oocyte Maturation inhibitory factor.

follicular Attresia

- Degeneration of undeveloped follicles are known as follicular Attresia.
- Degenerated follicles are known as Attretive follicles.
- Sometime rate of follicular Attresia increase it may be due to vit·E deficiency or as a side effect of oral contraceptive pills.
- when Graffian follicle ruptured some theca cells show their existence in ovary known as Interstitial cell's these cell's release androgen.
- Sometime in some menopausic female if interstitial cell's still show their Existence, due to androgen some male like character appear i.e, Hirsutism (Unwanted body hair, moustache, bread, low pitch voice, aggrection).

Rx Oestrogenic therapy + Anti-Androgenic Drugs.

Menstrual Cycle / Bleeding Cycle (28 days) (20-35 days)

- Menstrual cycle is one of the best Example of biological clock controlled by Hypothalamus.
- M.C found in females of primates (old world money, Apes, human).

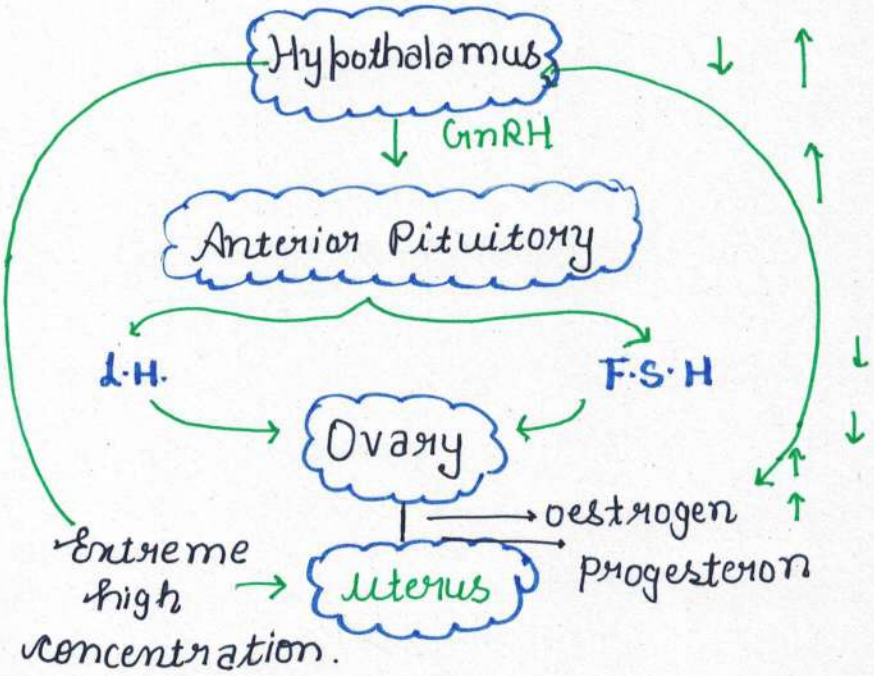
Menarch → starting of m.c. of puberty
|
→ Reproductive Age.
Menopause → permanent stoppage of m.c.

Amenorhoea → Temporary stoppage of menstrual cycle.

During reproductive age there are only two reason by which Menstrual cycle temporary stop.

(i). Pregnancy (ii) Lactational.

Mensus blood not get clotted due to presence of fibrolysin in mucus of uterus formed by progesterone.



Progesterone oestrogen → GnRH L·H· F·S·H

Ove feedback { ↑ ↓ ↑ ↓

Ove feedback { Extreme high concentration. ↑

LH surge (6-10 folds)

F·S·H surage 2-3 folds

Stages (phase)	Hormonal change	Ovarian changes	Uterine changes
(i) Bleeding phase/ Mensus phase	Initial (1-3rd days) Prog↓ Oest↓ GnRH↓ LH↓ F.S.H↓ Terminals. Prog↓ Oest↓ eve feed back base GnRH↑ LH↑ FSH↑	complete degeneration of C-Albian's 6-1-pri-follicle Active and starts converting in 1-2 pri.Sec.follicle.	- prostagladin form-pain - Str.functionate get Separated from str.basalis. so bleeding occurs via Vaginal route ↓ Bleeding Blood, Mucus unfertilised Egg. ↓ Avg. bleeding 40-80ml/mc. Bleeding gradually slow. - Bleeding stop - Nen st. functionate formed - Hyperplasia in Endometrium. → Hypertrophy in myometrium → Size of strata-functional Increased
(ii) Pre-Ovulation/ phase or follicular phase or Oestrogenic phase or Proliferative phase.	Initial (6-10/11day) ↓ eve feedback GnRH↑ L.H↑ F.S.H↑ Terminals (10/11 → 14th day Initial (15-23rd day) ~~GnRH~~	1-2 sec follicle 1 ter follicle 1 ter.follicle 1 Gnature ter.follicle/GFS	

(iii) Post ovulatory phase or Leutecal phase or progestemonic phase or Secreatory phase.

GnRH, L·H, ESH, completely low

Terminal

Prog ↑ oest ↑

↓ ove feedback

GnRH ↓ LH·↓ F·S·H.

What are the functions of prostagtonation in girl as it is for dilation.

Ruptured G·F

↓

C. haemorrghium

↓

C. leuteum

↓

C. leuteum

↓ degenerated

C. albian's

- Glondular and secretory nature of endometrium develop.
→ uterime wall thickness is Maximum at 23rd day.
→ Atrophy in myometrium.
→ uterine wall thickness decreases.

Hormonal change in terminal stage of Pre-ovulatory phase

Extreme high conc^{n} of oestrogen

↓ +ve feedback

Gn R.H.

F.S.H (2-3 folds)

Oogenesis inside G.F.

↓ 1st meiotic div. completed

Sec. Oocyte

↓ IInd meiotic div started but arrested at Metaphase

Sec. Oocyte (Metaphase)

L.H. (6-10 folds)

Due to granulosa cells and theca cells start secreting progesterone in place of Oestrogen.

Synthesis of proteolytic Enzymes (collagenase).

↓

Weakning of theca layer's discruption of tunicals Albuginea.

Glandular Nature of granulosa cells increased

↓

Amount of Antrum fluid ↑sed

↓

Swelling in G.F.

↓

Pressure inside G.F. ↑sed.

Rupturing of G.F and Ovarian wall

↓ Ovulation phase

Ovulation.

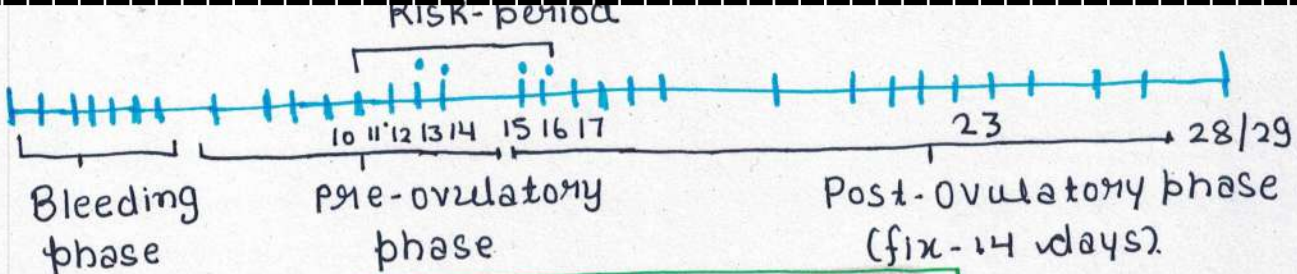
↓

Sec. Oocyte (meta)

via peritoned cavity.

Ampulla of fallopian tub.

Sec. Oocyte (Metaphase).



Risk period :- Ovulation day = m·c = 14 days

from mid pre-ovulatory to mid post-ovulatory

Safe period :- from mid post ovulatory to mid pre-ovulatory.

Question :- A female is having m·c of 21 days the day of ovaluation will be....

Ans :- O·D = m·c − 14
O·D = 21 − 14
O·D = 7 days.

Question :- M·C = 34, O·D = ?

Ans :- O·D = 34 − 14
O·D = 20 days.

Question :- A female is having m·c of 35 days, find her risk period?

Ans :- O·D = 35 − 14
O·D = 21 days
−4 → 17
+2 → 23
} Risk period

Question :- M·C = 20 days, Risk period = ??

Ans :- O·D = 20 − 14
O·D = 6 days
−4 → 2
+2 → 8
] Risk period.

Question :- A 30 year virgin female, her puberty started at 10 year, how many ova she has produced till Now.

Type (i) (i) 195 (ii) 240 (iii) 400 (iv) 300

Type (ii) i) 195 (ii) 240 (iii) 400 (iv) 0

option 2 in type 1 because her (a.t.q) duration of m.c = 30 - 10 = 20 years

20 years

× 12 Month (Each month 1 ova)

240 ova

option 1 → ccusa ova means oogonia fertilised by sperm.

Question :- A 20 years female her puberty started at 10 yrs she is having 3 children, how many ova she has produced till Now.

Type (i) i) 195 (ii) 240 (iii) 400 (iv) 300

Type (ii) (i) 195 (ii) 240 (iii) 400 (iv) 3

M.C duration =

30 - 10 = 20 years

total ova = 20 X 12

= 240 ova.

3 x pragnency (9) = 27

3 x lactational (6) = 18

45

240 - 45

= 195 ova.

	Ovarian changes	Uterine changes	M.C.	fertilisation
Tubectomy (Surgical cutting of f.t)	✓	✓	✓	✗
Hysterectomy (Surgical removal of uterus)	✓	✗	✗	✗
Oophectomy (Surgical removal of ovary)	✓	✓	delayed M.C	✓
	✗	✗	✗	✗

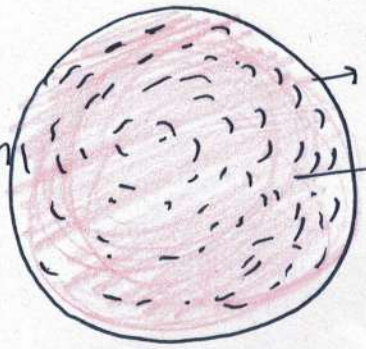
Oophectomy (Both ovaries) During pregnancy
- Initial 4th Month → Abortion
- After 4th Month → Normal pregnancy

Types of Egg :-

SS.S

on the basis of distribution of yolk :-

(a). Homolecithal / Isolecithal :- Eg → Alecithal, Microlecithes.

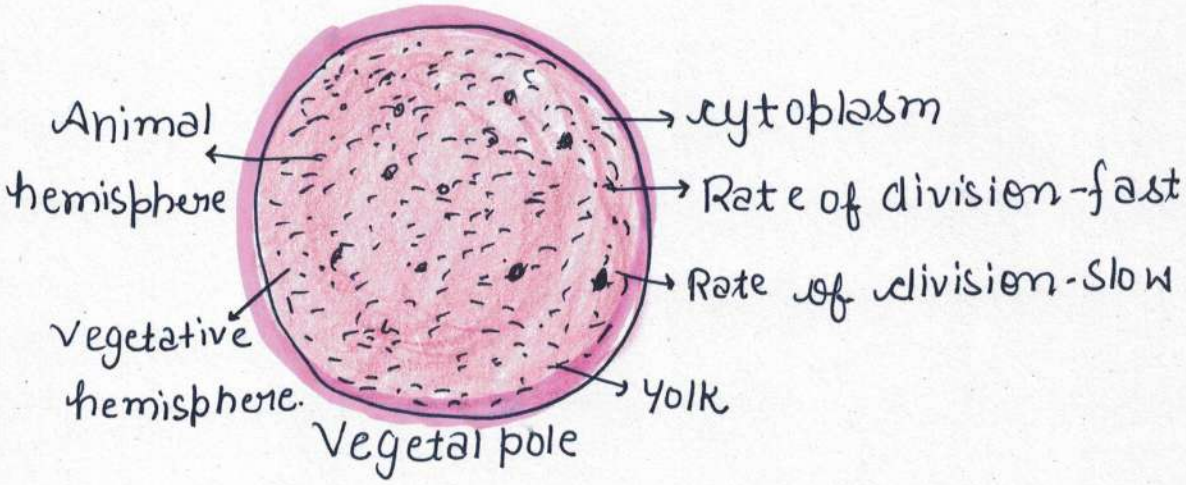


uniform distribution of yolk

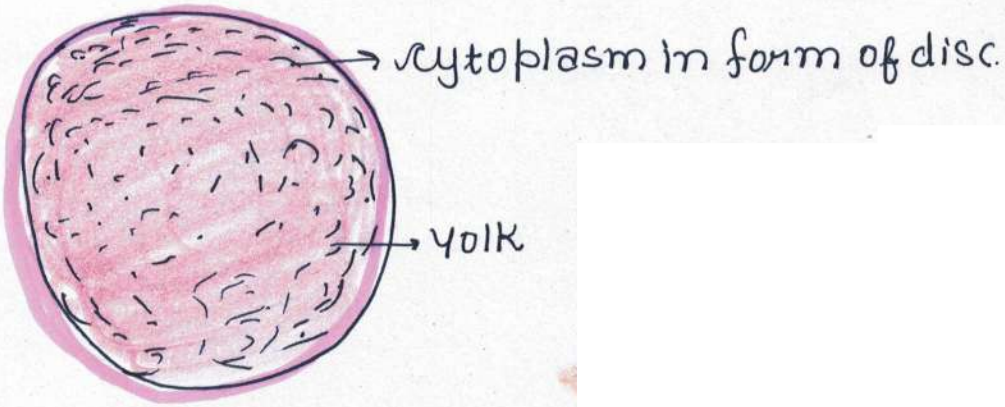
cytoplasm
yolk

cytoplasm → contain non living part.

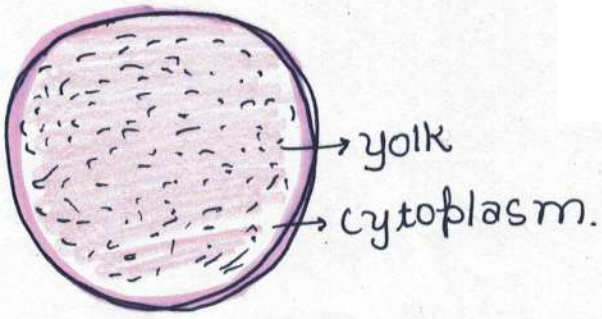
(b.) Telolecithal :- Mesolecithal



(c) Discoided :- Eg → Prototherian, Birds. Reptiles.



(D). Centrolecithal :→ Eg. Insects



In hen's Egg- 6000- 7000 pores are present for gaseous Exchange if wax or paint is applied on it Embryo will die.

Egg → Oocyte/ovum + Egg membrane.

Oocyte until second meiotic division not completed.

Ovum After completion of second meiotic division.

Types of Egg Membrane

(i) Primary Egg Membrane Secreated by oocyte

Example :- Zona pellucida, Zona radiata, Vitelline. (Shark).

(ii) Secondary Egg Membrane secreated by ovary.

Example: Corona radiata, chorion (Insects).

(iii). **Tertiory Egg Membrane:** secreated by follopian tube or uterus.

Example:- $CaCO_3$ shell, jelly coat.

- Primary + Secondary = Human, Insect
  [Zona pellucida + Corona radiata] [Vitelline + chorion]
- Primary + teritory = Birds, Reptiles, Prototherion, Amphibions.
  [Vitelline + $CaCO_3$ shell] [Vitelline + jelly coat]
- Pri + Sec. + ter = Not yet found.
- Sec + ter =

Human ovum → unicellular
Human Egg → Multicellular.

Fertilization

- Fusion of two haploid gametes to Attain diploid Number of chromosomes is known as fertilization.
- In human fertilization is a chance Event and to Improve the male release millions of sperms and size of Egg is 1000 times larger than sperm.

- Syngony → fusion of gametes
- Plasmogamy → fusion of cytoplasm
- Karyogamy → fusion of Nucleus.
- Amphimixis → Intermingling of chromosomes / crossing over.

fertilization

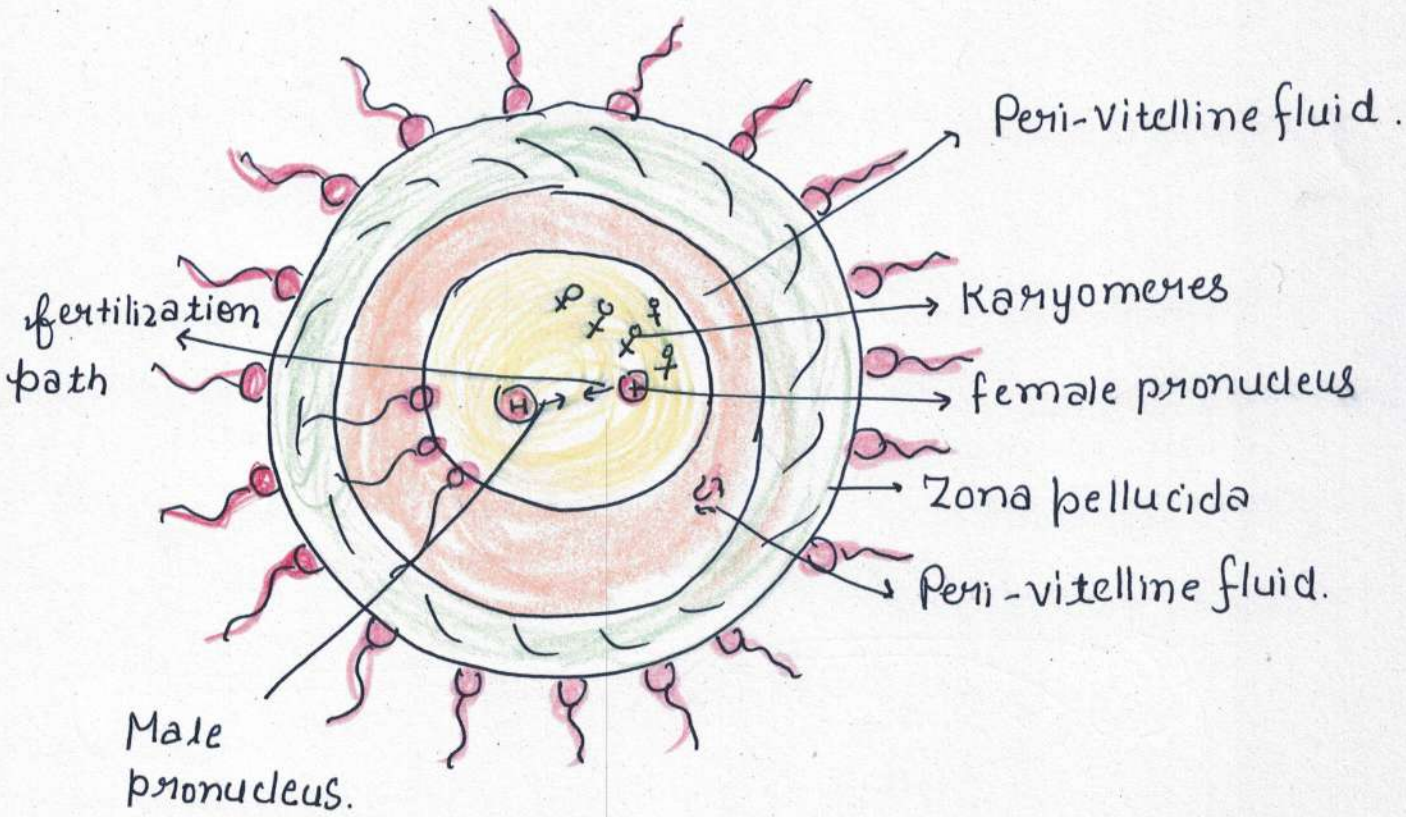
Internal
i.e. Inside female body
Eg. Human, Hen

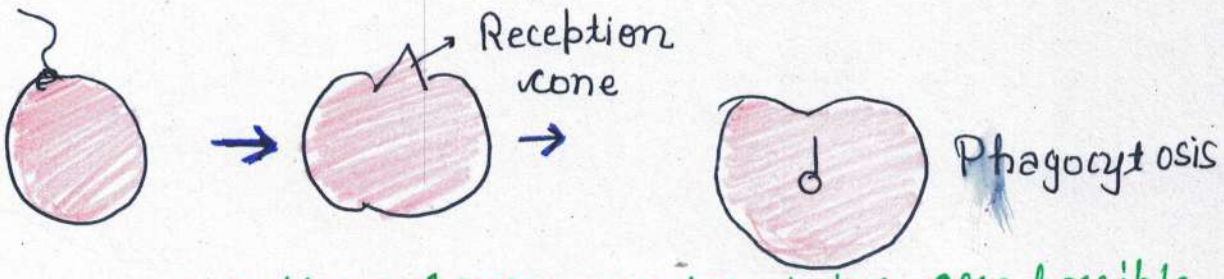
External
i.e. outside female body
Eg. Sea-urchin.

Fertilization

self
i.e. Bi sexual Animals
Eg → Taenia - Soleum.

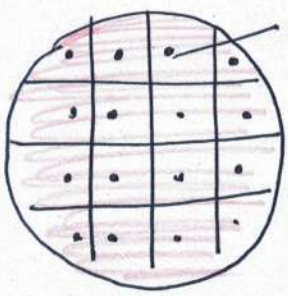
cross
i.e. Unisexual Animals
Eg. Human.





In human at a time 8 monozygotes twins are possible due to high totypotency of blastomere.

Cleavage / Cellulation / Segmentation / closed mitosis



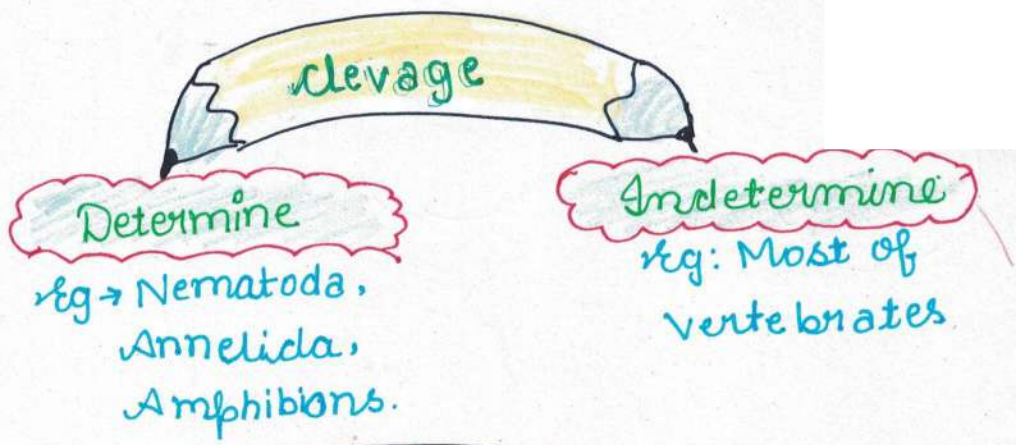
$$K.I = \frac{\text{volume of Nucleus}}{\text{volume of cytoplasm}} \uparrow$$

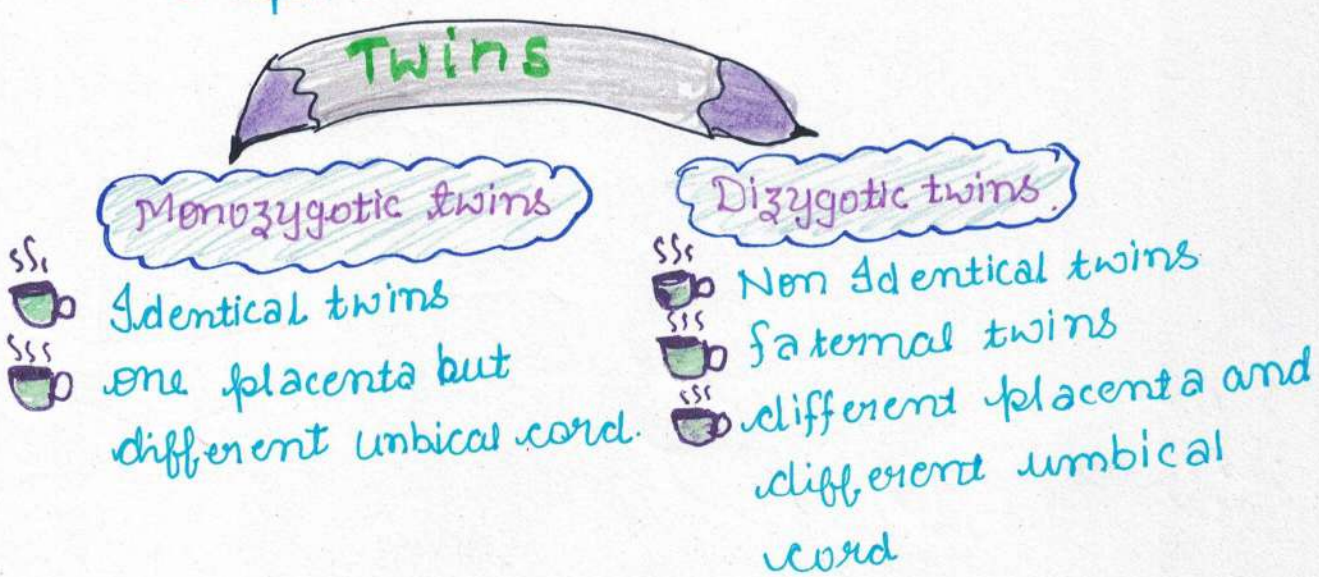
K.I = Zygote → Normal somatic cell

5507 1.

Division in fertilized egg or zygote without increasing its size is known as cleavage.

- Cleavage occur until N·I of each Blastomere become Equal to Normal Somatic cell then End of gastrula stage.
- In cleavage interphase is very short in which only S-phase is present G1 and G2 are completely absent
- Zygote → morula (8-16) → Blastula (32) → End stage of Gastrula.
- **Baifour's law** → Rate of cleavage $\propto \frac{1}{\text{Amount of yolk}}$.
- **Sach's law** → According to it, cleavage Always occur at right angle to Each other.

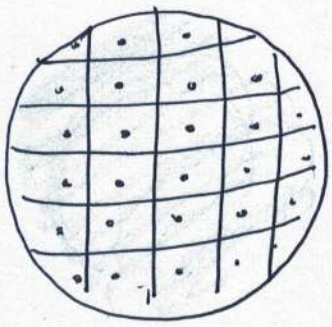




Cleavage

Complete / Holoblastic

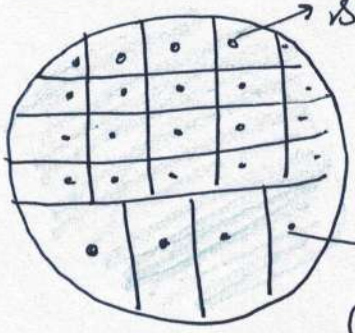
Equal holoblastic



Eg:- Homolecithal egg.

Exception:- Human

Unequal holoblastic



Eg: Telolecithal Egg, human.

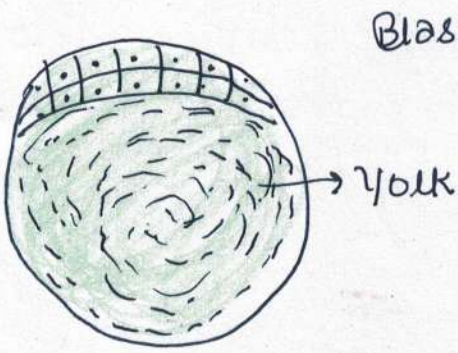
Incomplete / Meroblastic

Discoidal Meroblastic

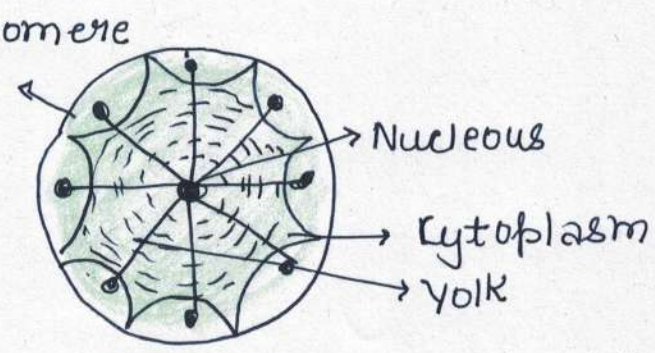
Eg:- Birds, Reptiles, prototherians.

Superficial Meroblastic

Eg: Insects.



Discoidal Meroblastic



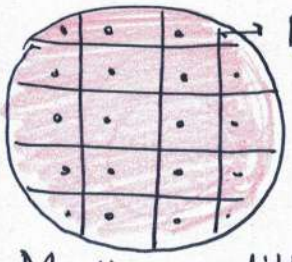
Superficial Meroblastic

Embryonic Stages

Diversity

(i) **Morula** (8-16) cell

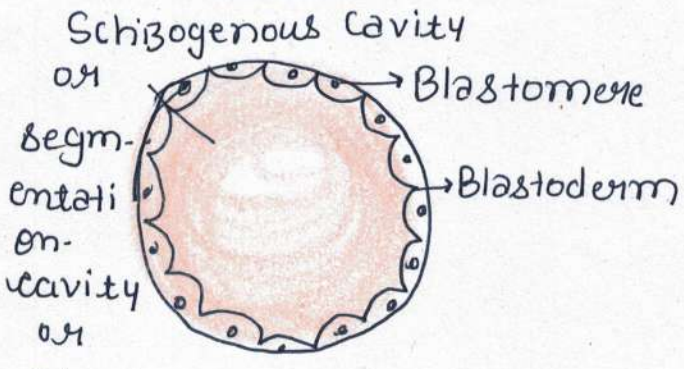
- ↙ developing Morula
- ↘ Developed Morula



Mulberry like Appearance

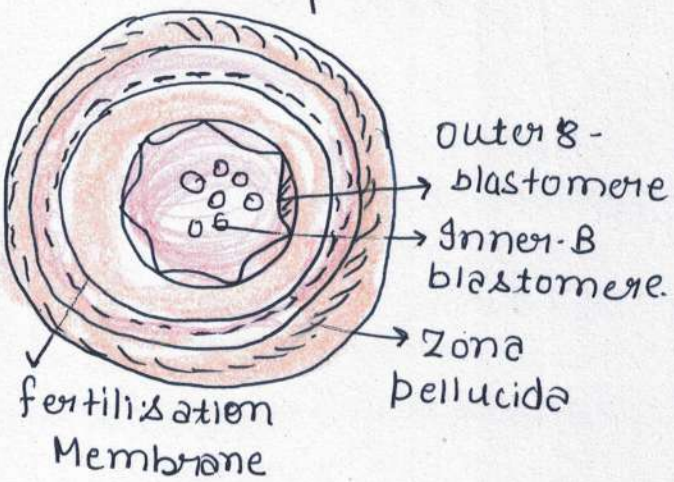
(ii) **Blastula:**

(Coeloblastula) (32 cell).

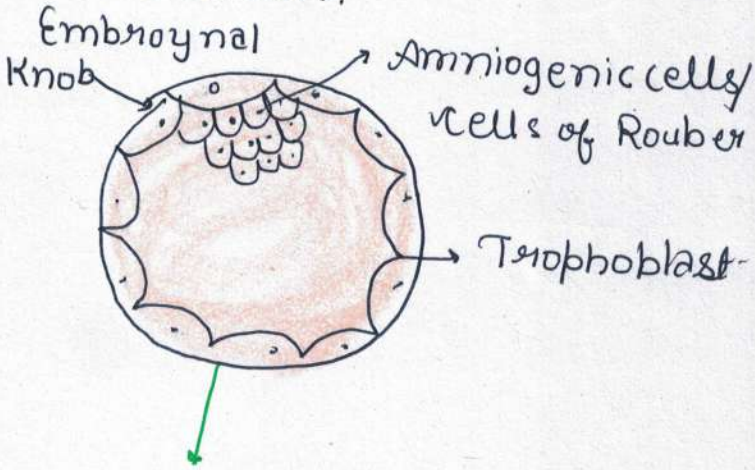


Human

(i) **Morula** (8-16) cell compaction.



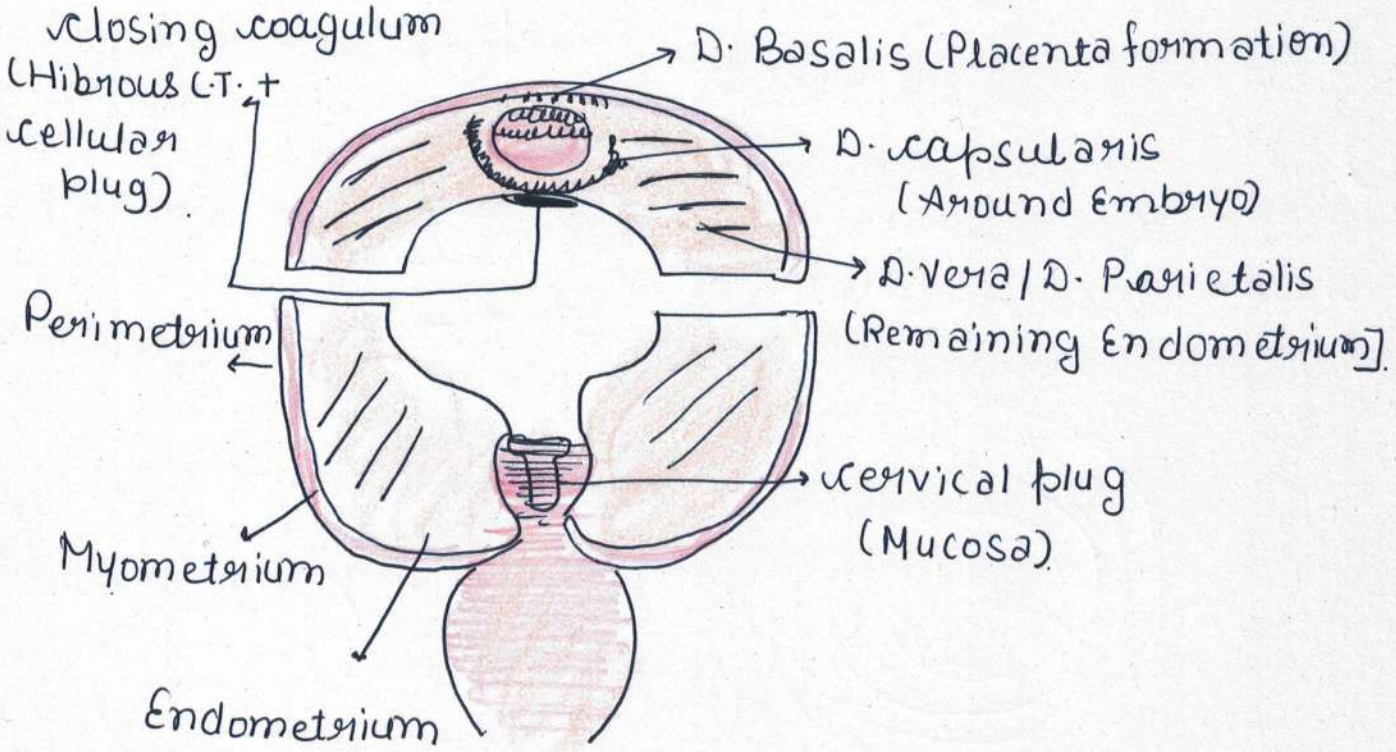
(ii). **Blastula:** (Blastocyst) (32 cell).



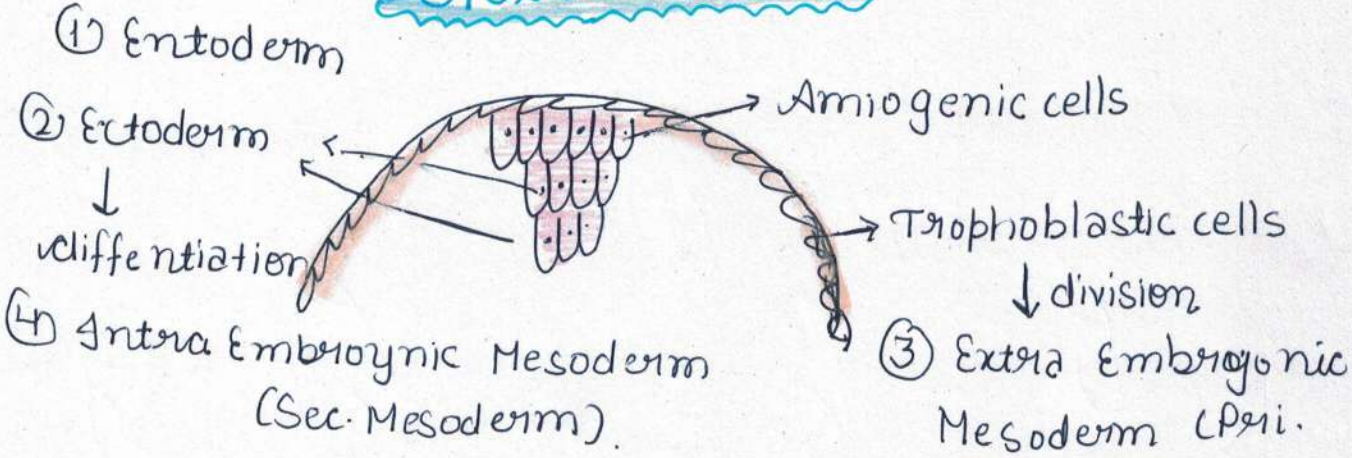
Zona pellucida prevent ectopic pregnancy - Screening of sperm.

→ If on 24th day. presentone is (+)ve then female is 100 %. pregnent.

→ BCG is responsible for Nausea, Vomiting during pregnency.



Gastrulation



Zygote → Morula → Blastula → Gastrula

Inner 8 - Blastomere → Embryonal knob → 3 Germinal layer → Embryo

outer 8 - Blastomere → Trophoblastic cells →
Aminogetic cell :→ External Embryonic Mesoderm →
Extra Embryonic Membrane.

Organogenesis:

Intra Embryonic Mesoderm in chordates

↓

Notachord formation

↓

Degeneration of Notachord

↓

Ramanant of Notachord → Nucleous pulposal.

↓

Replacement of Notachord by Vertebral column

Ectoderm

Neural tube formation / Newrilation

Anterior part → Brain.

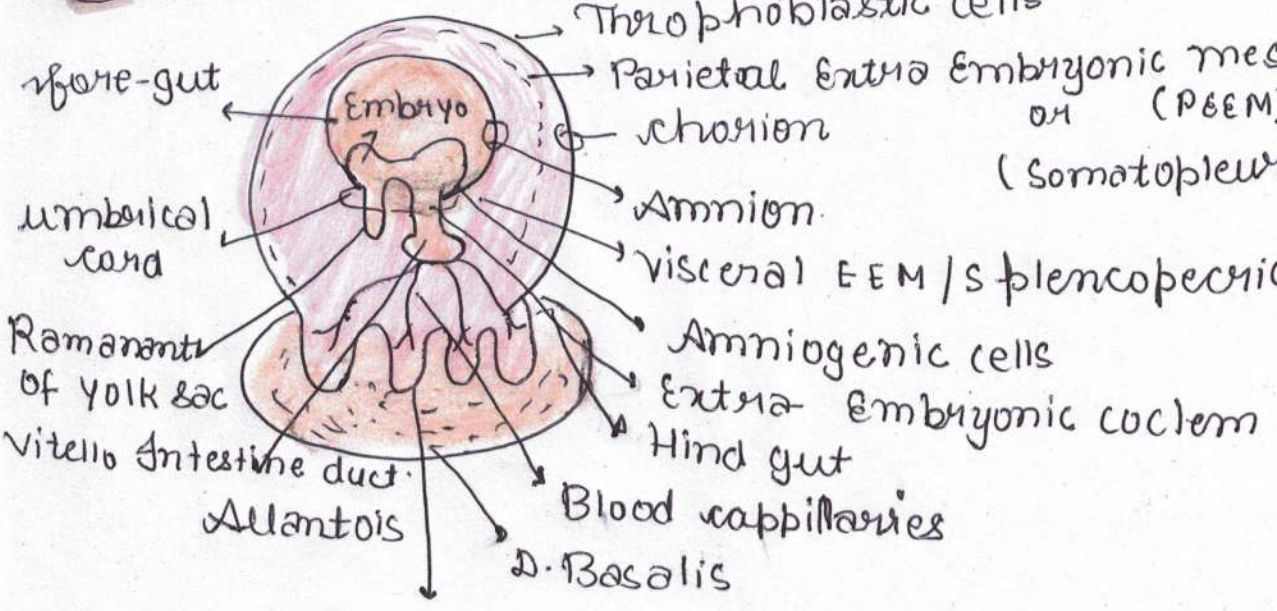
Pasterior part → Spinal cord

At 14th day of fertilisation
Ist differential organ.

- Placenta is a connection in between mother and foetus.
- Amnion does not participate in formation of placenta.
- Umbical cord is a connection in between placenta and foeties.

- Chorion does not participate in formation of umbilical cord.
- In Megalecithal Eggs allantois work as a urinary bladder.

Extra-Embryonic Membranes



Amniotic fluid = 1 litre
Oligohydromnious = 500ml > Abortion
Polyhydromnious = 1500ml < Intra-uterine growth Restriction.

content umblical cord

2 umblical arteries
→ carry deoxygenated
→ blood from foetus to placenta

1 umblical vein.
→ carry oxygenated blood from placenta to foetus.

According to Gynecologists, pregnancy is a burden to female.

Placental Hormone

Steroidal Hormone
- Progesterone.
- Estradiole / oestrogen

Proteneous Hormones.
- HCG- human chorionic Gonadotropin.
- HCS- human chorionic Somatomono-tropin.
- HCT- human chorionic Thyrotrepin.
- HCC- Human chorionic corticotropin.
- HPL- Human placental Lactogen.
- Relaxin- Ruptured placenta.

Proteneous Hormone

Human chorionic Gonadotropin →
- Maintain corpus Leuteum
- Development of gonads
- Pragnancy test

Human chorionic Somatomonotropin →
- Growth hormone ← Mother

Human chorionic Thyroptropin → Thyroxine ← Mother

Human chorionic corticotropin → cortisol ← Mother
↓
BP and BHR control

Human Placental Lactogen → from 7th Month
↓
Plalaction from Mother.

Relaxin → Ruptured placenta.
- Widening of pelvic girdle
- Lubrication to Birth canal.